

MHI
Copy 3

TER COPY

FM 6-20

DEPARTMENT OF THE ARMY FIELD MANUAL

Supp. 1 6-20-1 (27 Oct 51)
6-20-2 (8 Jan 52)

FIELD ARTILLERY TACTICS AND TECHNIQUES

QUARTERMASTER LIBRARY
QUARTERMASTER SCHOOL, U. S. ARMY
QUARTERMASTER COMMAND, U. S. ARMY
RESCINDED
FOR HISTORICAL USE ONLY



HEADQUARTERS, DEPARTMENT OF THE ARMY
DECEMBER 1958

FIELD MANUAL }
No. 6-20 }

HEADQUARTERS,
DEPARTMENT OF THE ARMY
WASHINGTON 25, D. C., 10 December 1958

FIELD ARTILLERY TACTICS AND TECHNIQUES

	Paragraphs	Page
CHAPTER 1. GENERAL.....	1-5	3
2. GENERAL CHARACTERISTICS OF FIELD ARTILLERY.	6, 7	6
3. FIELD ARTILLERY ORGANIZATION----	8-14	7
4. COMMAND, CONTROL, AND COORDINATION		
Section I. Command responsibilities and relationships---	15-20	9
II. Field artillery staffs-----	21-34	12
III. Control and coordination-----	35-40	21
IV. Estimate of field artillery requirements-----	41-44	25
CHAPTER 5. TACTICAL EMPLOYMENT OF FIELD ARTILLERY		
Section I. Principles of employment-----	45-50	28
II. Organization for combat-----	51-62	30
III. Observation-----	63-66	40
IV. Survey-----	67-69	44
V. Maneuver of field artillery units-----	70-79	46
VI. Auxiliary weapons-----	80-84	56
VII. Factors affecting the employment of certain types of field artillery units.	85-90	58
VIII. Army aviation-----	91-94	64
CHAPTER 6. OFFENSIVE COMBAT-----	95-104	66
7. DEFENSIVE COMBAT AND RETROGRADE MOVEMENTS		
Section I. Defensive combat-----	105-107	70
II. Retrograde movements-----	108-111	75
CHAPTER 8. FIELD ARTILLERY IN SPECIAL OPERATIONS		
Section I. General-----	112-117	78
II. Amphibious operations-----	118-123	80
III. Airborne operations-----	124-129	90
IV. Operations in deep snow and extreme cold-----	130-137	93

* This manual supersedes FM 6-20, 22 October 1953, including C 1, 5 May 1955, and C 2, 9 February 1956.

	Paragraphs	Page
Section V. Mountain operations.....	138-144	96
VI. Jungle operations.....	145-154	99
VII. Desert operations.....	155-157	102
VIII. Combat in towns.....	158-160	103
IX. Field artillery in river crossings.....	161-163	104
X. Coastal frontier defense.....	164, 165	107
CHAPTER 9. TARGET INTELLIGENCE AND ANALYSIS		
Section I. General.....	166, 167	108
II. Target intelligence.....	168-175	108
III. Target analysis.....	176-184	115
CHAPTER 10. PROCEDURES AND TECHNIQUES FOR HANDLING TERRESTRIAL TARGET INFORMATION		
Section I. General.....	185, 186	125
II. Processing target information.....	187-191	125
III. Counterbattery activities.....	192-196	133
IV. Countermortar activities.....	197-201	138
V. Shelling reports.....	202-210	144
VI. Location of hostile guns and howitzers by crater analysis.	211-215	151
VII. Location of hostile mortars by crater analysis.	216-218	155
CHAPTER 11. COORDINATION OF FIRE SUPPORT		
Section I. General.....	219-222	159
II. The fire support coordination center.....	223-229	161
III. Procedure.....	230-232	168
CHAPTER 12. FIRE PLANNING.....	233-244	172
13. FIELD ARTILLERY FIRE DIRECTION		
Section I. Organization and operation.....	245-247	188
II. Massing the fires of more than one battalion...	248-253	195
CHAPTER 14. COMMUNICATION.....	254-264	198
15. AMMUNITION SUPPLY.....	265-269	207
APPENDIX I. REFERENCES.....		211
II. FORMS AND EXAMPLES.....		215
III. ILLUSTRATIVE EXAMPLE, PLANNING FIELD ARTILLERY OPERATIONS AND FIRE SUPPORT.		248
IV. A PROCEDURE FOR PREPARING SCHEDULES OF CORPS ARTILLERY FIRES.		271
INDEX.....		277

CHAPTER 1

GENERAL

1. Purpose and Scope

This manual is a guide for field artillery officers and commanders and staffs of all combat arms. It is concerned with the tactical employment of field artillery. It covers organization, command, and tactical control of field artillery. It includes a discussion of the techniques involved in target intelligence and analysis, field artillery fire planning, and the direction of field artillery fires. It includes a general discussion of the principles, organization and techniques of coordination of fire support with particular emphasis given to field artillery aspects. The employment of field artillery in airborne, amphibious, and other special operations is covered. Where the term *artillery* is used in this manual, it refers to *field artillery*. For employment of *air defense artillery*, see FM 44-1 and other manuals of the 44-series. For additional references, see appendix I. The material presented herein is applicable without modification to both nuclear and nonnuclear warfare.

2. Classification

Field artillery weapons are classified as cannons or missiles.

a. Cannons are those weapons that discharge projectiles out of tubes by means of an explosive which may be separate from the projectile, a part of the projectile, or a combination of both.

b. Missiles are those weapons that, when fired, are powered in flight by a propulsion means contained within the projectile. Missiles may be guided or free flight missiles.

(1) Guided missiles are those missiles whose trajectory or flight path may be altered after firing.

(2) Free flight missiles are those missiles whose flight path cannot be altered after firing.

3. Cannons

a. Field artillery cannons are classified according to caliber and maximum range capability as *light*, *medium*, *heavy*, and *very heavy*. Self-propelled cannons are given the same classification as their towed counterparts. All cannon are considered as short range field artillery.

- (1) *Light*—under 115 mm, the maximum range capability does not exceed 16,500 meters.
- (2) *Medium*—115 mm or larger, the maximum range capability does not exceed 16,500 meters.
- (3) *Heavy*—less than 210 mm, the maximum range capability exceeds 16,500 meters.
- (4) *Very heavy*—210 mm or larger, the maximum range capability exceeds 16,500 meters.

b. Field artillery cannons are classified according to their method of organic transport as towed, self-propelled, and aeropack.

- (1) *Towed*—cannon designed for movement as trailed loads behind prime movers. This includes weapons transported in single and multiple loads, and weapons transported in a single load by multiple prime movers.
- (2) *Self-propelled*—cannon permanently installed on vehicles which provide motive power for the piece and from which the weapon is fired. Self-propelled weapons may be either armored or unarmored.
- (3) *Aeropack*—cannon designed for transport, assembled or in sections, by army aircraft. The weapon and carriage are partially disassembled for transport and reassembled for firing from ground positions.

c. The methods of aerial transport and delivery of cannon are identified as follows:

- (1) *Aeropack*—cannon designed for transport, assembled or in sections, by Army aircraft. The weapon and carriage may be partially disassembled for transport and reassembled for firing from ground positions.
- (2) *Air transportable*—cannon whose gross weight is within the lift capabilities of—
 - (a) Medium and medium assault transport aircraft.
 - (b) Heavy transport aircraft.
- (3) *Heavy drop*—cannon which can be delivered from medium assault, medium transport, or heavy transport aircraft by parachute.

4. Missiles

a. Field artillery missiles are classified according to their range capability as short range, medium range, and long range.

- (1) *Short range*—maximum range does not exceed 40 kilometers.
- (2) *Medium range*—maximum range does not exceed 200 kilometers.

(3) *Long range*—maximum range exceeds 200 kilometers.

b. The methods of aerial transport and delivery of field artillery missiles are—

(1) *Air transportable*—launchers and missiles whose assembled or disassembled gross weight are within the lift capabilities of—

(a) Medium or medium assault transport aircraft.

(b) Heavy transport aircraft.

(2) *Heavy drop*—launchers and missiles which can be delivered from medium transport, or heavy transport aircraft by parachute.

(3) Launchers and missiles which can be transported by helicopter.

5. General Missions

The two general missions of field artillery in combat are to—

a. Support the other arms by fire, neutralizing or destroying those targets which are most dangerous to the supported arms.

b. Give depth to combat and isolate the battlefield by counterfire, by fire on hostile reserves, by restricting movement in rear areas, and by disrupting hostile command facilities and other installations.

CHAPTER 2

GENERAL CHARACTERISTICS OF FIELD ARTILLERY

6. Capabilities

Field artillery is the principal agency of ground fire support. It is equipped with mobile cannon, missiles, and equipment required for fire control, movement, observation and surveillance, and communication. It provides a powerful means of influencing the course of combat. The efficient exploitation of field artillery capabilities depends on control, liaison, communication, observation, location and evaluation of targets, survey control, and logistical support. The capabilities of field artillery include the ability to—

- a.* Maneuver nuclear fires and massed nonnuclear fires rapidly within a large area and on a wide front without change of positions.
- b.* Displace quickly.
- c.* Regroup units to bring greater firepower on important sectors.
- d.* Deliver accurate fire with appropriate caliber and type of ammunition on targets encountered under all conditions of visibility, weather, and terrain.
- e.* Deliver fires with or without adjustment. The latter method enhances the effect of fires by shock and surprise.

7. Limitations

a. The principal limitation of field artillery is its reduced effectiveness and increased vulnerability during displacement.

b. Adequate control is essential to the maximum effectiveness of field artillery. This control depends on close liaison with the supported, reinforced, and adjacent units; on adequate observation and survey; and dependable communication facilities. Control is facilitated by accurate maps. Without adequate, timely intelligence and efficient fire control procedures, artillery cannot capitalize on targets of opportunity. It is particularly vulnerable to enemy air action. It requires large amounts of ammunition for nonnuclear fires, except where ammunition performance data are available and predicted fire technique can be used. Maximum accuracy of cannon requires registration which may sacrifice surprise. Field artillery's surface mobility is sensitive to difficult terrain.

CHAPTER 3

FIELD ARTILLERY ORGANIZATION

8. General

The organization of field artillery units and headquarters is shown in detail in appropriate tables of organization and equipment. The composition, in terms of units, of field artillery echelons is flexible and is determined by the organization for combat.

9. Field Artillery Battalion Group

a. In the absence of a group or other suitable headquarters, a battalion may be attached to another battalion to form a battalion group (pars. 17 and 57). The battalion group headquarters has the same function as the group headquarters.

b. In the absence of a battalion or other suitable headquarters, a battery may be attached to another battery to form a battery group (par. 57). The battery group headquarters has essentially the same function as a battalion headquarters.

10. Field Artillery Group

a. Field artillery groups are classified as field artillery group and field artillery missile group (heavy). The field artillery group consists of a headquarters and headquarters battery and such units as may be attached. The group provides flexibility in organization for combat, since the number, type, and caliber of attached units may be varied to meet the needs of the situation. While the units attached to a group may be of the same or different calibers and types, mixed calibers and types permit greater flexibility in employment. The group organization provides centralized tactical control as well as a limited degree of administrative supervision.

b. The field artillery missile group (heavy) is organized as a tactical and administrative unit and is self-sustaining. It is composed of a group headquarters; headquarters battery; a field artillery missile battalion, Redstone; and engineer company, Redstone; and an ordnance company, Redstone.

11. Division Artillery

Division artillery consists of a division artillery headquarters and headquarters battery, other units organic to division artillery, and such field artillery units as are assigned or attached to the division

and retained under the command of the division artillery commander. *Artillery with the division* includes the division artillery and the field artillery of the battle groups subordinate to the division. It has the personnel and equipment necessary for communication and observation and the minimum number of units required for combat. Additional field artillery support is ordinarily provided and is obtained by attaching field artillery units to the division or by reinforcing the fire of the division artillery with corps artillery, adjacent division artillery or artillery of a division in reserve.

12. Corps Artillery

Corps artillery consists of the corps artillery headquarters and headquarters battery, the field artillery observation battalion, the field artillery searchlight battery, the corps artillery aviation company, and such field artillery units as are assigned or attached to the corps and retained under command of the corps artillery commander. *Artillery with the corps* includes the corps artillery and the field artillery with the divisions subordinate to the corps.

13. Army Artillery

Army artillery consists of such field artillery units as are assigned or attached to the army and retained under command of the army artillery commander. *Artillery with the army* includes army artillery and field artillery with the corps subordinate to the army.

14. Army Group and Theater Army Artillery

Artillery representation at these echelons consists of artillery staff sections as necessary to fulfill the requirements of the particular organization. Field artillery units normally are not retained under control of these headquarters.

CHAPTER 4

COMMAND, CONTROL, AND COORDINATION

Section I. COMMAND RESPONSIBILITIES AND RELATIONSHIPS

15. General

a. In army group and higher headquarters, the senior artillery officer in the artillery staff section is designated as the *artillery officer*. He is a special staff officer and advises the commander on field artillery matters.

b. In an army, corps, division, or task force, the senior officer in the artillery headquarters is designated as the *artillery commander*. He commands field artillery units retained under the control of the headquarters. In addition, he is the *artillery officer* on the special staff. As the artillery officer he advises the commander and staff on all field artillery matters and is the fire support coordinator for the command.

16. Command Relationships

a. Field artillery is a member of the tactical team employed by a commander to accomplish a certain mission. The relationship of the artillery commander to the force (supported unit) commander depends on the status of the artillery as a member of the team. When the artillery is assigned or attached to the force (supported unit), the artillery officer is both a subordinate commander and a special staff officer of the force (supported unit) commander. When artillery is neither assigned or attached to the force but is supporting the force, the artillery commander's relationship to the force commander is that of both an adviser and an independent commander obliged to render continuous effective fire support in accordance with his assigned mission. In either case, close coordination and liaison between commanders is essential for accomplishment of the mission.

b. There is no direct chain of artillery command from armies to corps, from corps to division, or from division to battle groups. Instructions for the artillery with a corps are issued in the name of the army commander. Instructions for division artillery are issued in the name of the corps commander.

17. Field Artillery Battalion Group (Battery Group) Commander

The field artillery battalion group (battery group) commander

is designated by the authority establishing the battalion group (battery group). He has the same functions and responsibilities as a group (battalion) commander in addition to commanding his own battalion (battery). The numerical (alphabetical) designation of the battalion group (battery group) is that of the battalion (battery) which is required to provide the battalion group (battery group) commander.

18. Field Artillery Group Commander

a. The field artillery group commander's responsibilities include the following command functions:

- (1) Coordinate observation and survey control within the group.
- (2) Plan fire support as necessary to carry out the group's assigned mission.
- (3) Control the fires of the group.
- (4) Direct training within the group.
- (5) When he is the senior artillery officer with a task force, perform additional duties as outlined in paragraph 19.

b. For responsibilities and command functions pertaining to the field artillery missile group (heavy), see FM 6-25, Field Artillery Missile Group (Heavy) (U).

19. Army, Corps, Division, and Task Force Artillery Commanders

The artillery commander of an army, corps, division, or task force has the following principal responsibilities:

a. Determine the requirements and recommend the allocations and employment of field artillery units, materiel, and ammunition. When appropriate, this includes requirements for units and materiel to replace or augment field artillery.

b. Command the assigned and attached field artillery not reassigned or reattached to subordinate units.

c. Plan for nuclear and nonnuclear field artillery fires in support of the plan of operations.

d. Advise the commander and staff on the employment of nuclear and nonnuclear field artillery fires.

e. Coordinate all field artillery observation within the zone of responsibility of the command (normally limited to echelons below field army).

f. Is responsible for the details of coordination of fire support as fire support coordinator for the command (ch. 11).

- g.* Collect, process, and disseminate information and intelligence.
- h.* Coordinate survey control for field artillery.
- i.* Direct the fire of assigned and attached field artillery not re-assigned or reattached to subordinate units.
- j.* Recommend assignment of field artillery personnel and estimate replacement requirements for field artillery units.
- k.* Direct the training of field artillery units within the command.
- l.* Counterfire activities. Corps artillery commander has responsibility for counterbattery activities. Division artillery commander has responsibility for countermortar activities. Task force artillery commanders have responsibility for both counterbattery and countermortar activities. When the distances are too great for effective centralized control of counterfire, these activities may be reassigned to subordinate artillery commanders who have or are provided the means to accomplish these activities.

20. Theater Army and Army Group Artillery Officers

The artillery officer of a theater army or an army group has such duties and responsibilities as are assigned by the commander. At these levels, the artillery section will consist of personnel experienced in all aspects of artillery. Theater army and army group artillery officers are usually assigned the following responsibilities:

- a.* Determine the number and types of nonorganic field artillery units required by the forces in the command, including special equipment for these units.
- b.* Recommend the allocations of the various types of field artillery to subordinate commands.
- c.* Recommend assignment of field artillery personnel and estimate replacement requirements for these units.
- d.* Supervise the training of field artillery units and replacement personnel within the command and the operation of any field artillery schools under the control of the commander.
- e.* Publish information and intelligence of interest to field artillery.
- f.* Plan for the reception and processing of field artillery units within his echelon.
- g.* Determine ammunition requirements and recommend allocation of ammunition.
- h.* Exercise, in the name of the commander, operational control of those field artillery units which have not been assigned or attached to subordinate units.

Section II. FIELD ARTILLERY STAFFS

21. General

a. The organization and functions of field artillery staff are flexible and may be varied by the artillery commander to meet the demands of each particular situation. Since the control of artillery and the coordination of fire support are the principal duties of an artillery commander, his staff is organized to assist him in the discharge of these responsibilities.

b. The composition and organization of a theater army or an army group artillery staff are determined by the artillery officer. He organizes his staff to aid him in carrying out his responsibilities (par. 20).

c. Personnel for field artillery staffs at army level and below are provided in appropriate tables of organization. Type functional organizations are shown in figures 1 through 4.

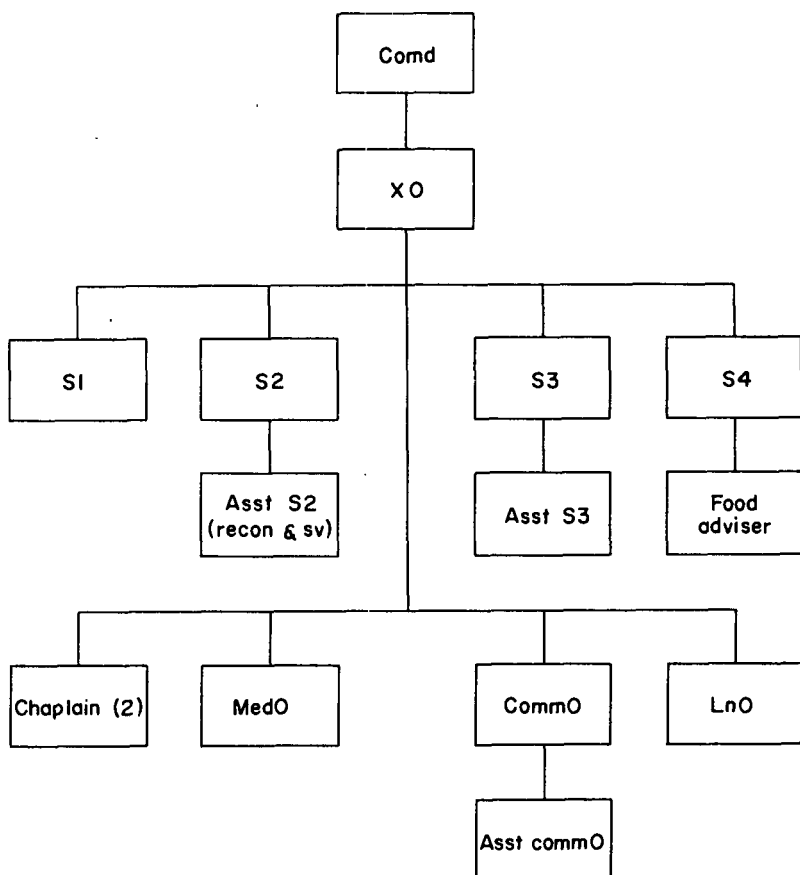


Figure 1. Type organization of a field artillery group staff.

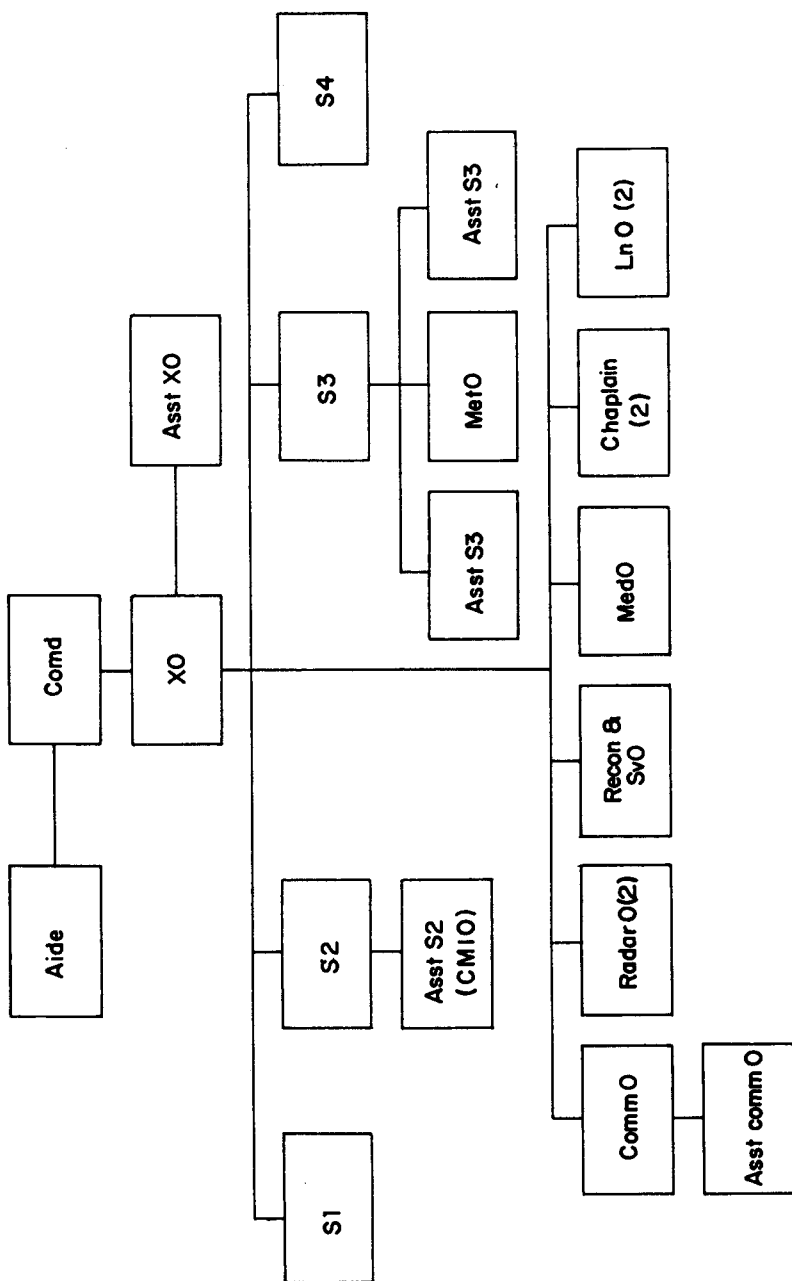


Figure 2. Type organization of a division artillery staff.

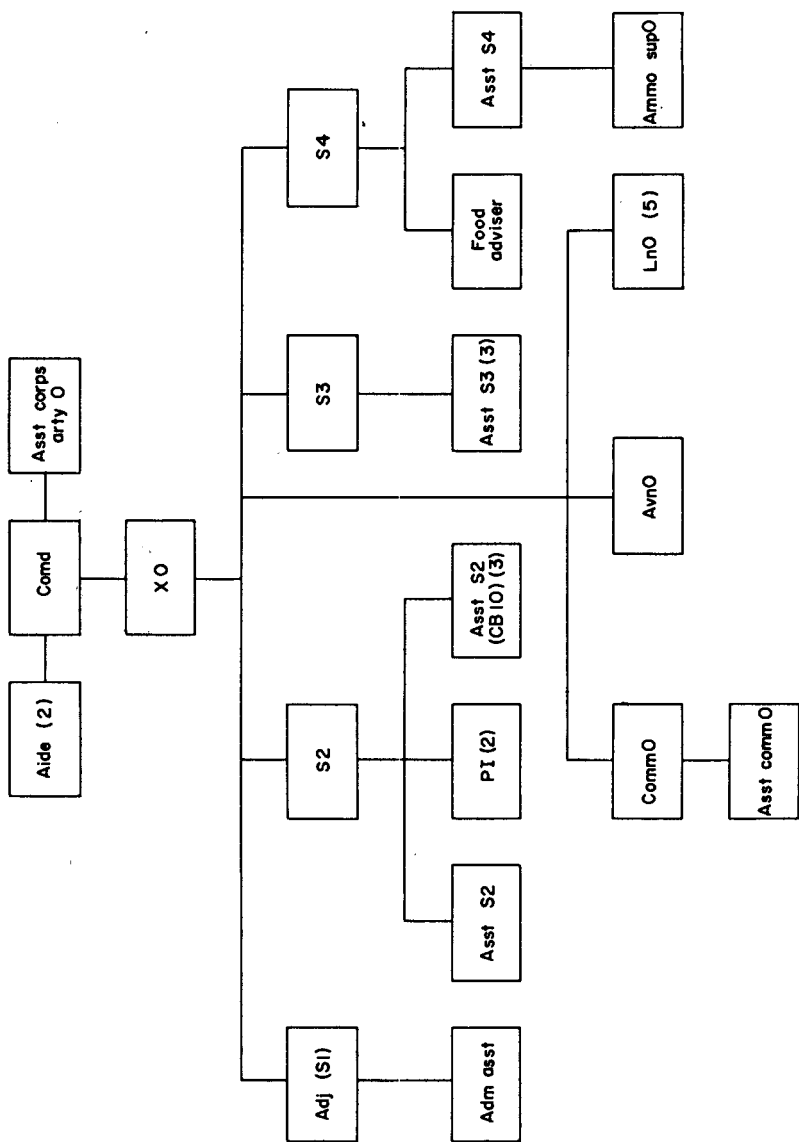


Figure 3. Type organization of a corps artillery staff.

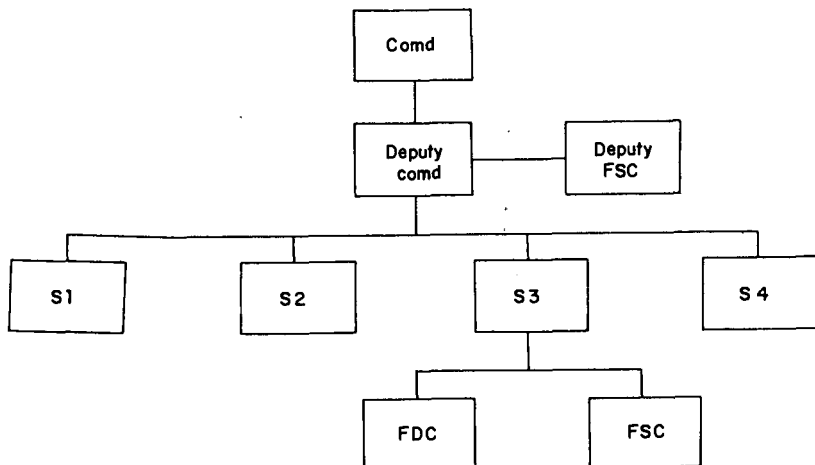


Figure 4. Type organization of an army artillery staff.

d. The duties of field artillery staff officers conform generally to the principles and procedures described in FM 101-5 for the corresponding general or special staff officers. Amplification of the duties of field artillery staff officers is discussed in paragraph 22 through 34.

22. Deputy Army Artillery Commander (Assistant Corps Artillery Officer)

The deputy army artillery commander (assistant corps artillery officer) performs such duties as may be assigned to him by the army (corps) artillery commander. These duties may require him to—

a. Serve as the army (corps) artillery commander's deputy at the army (corps) command post.

b. Supervise and coordinate the work of field artillery personnel at the army (corps) command post.

c. Act for the army (corps) artillery commander in his capacity as fire support coordinator (ch. 11).

d. As representative of the fire support coordinator, to provide the army (corps) commander with predictions of the radioactive fallout from friendly nuclear weapons.

23. Assistant Division Artillery Executive Officer

The assistant division artillery executive officer is the principal assistant to the division artillery commander in his capacity as fire support coordinator. The assistant division artillery executive officer performs duties as directed by the fire support coordinator, and represents him at the FSCC in his absence.

24. Executive Officer

In general, the executive officer of a field artillery staff performs the duties set forth in FM 101-5 for the chief of staff. Additionally, he may—

a. Direct the establishment of the field artillery command post in the location designated by the commander and insure that the various elements, properly protected and concealed, are disposed to facilitate operations.

b. Supervise the operation of the field artillery command post to include the fire direction center.

25. Adjutant (S1)

The S1 or adjutant of a field artillery staff is the adviser to the commander on matters pertaining to personnel and general administration. When a separate S1 is not provided, another staff officer is designated to perform his duties.

26. S2

The S2 of a field artillery staff is primarily concerned with the direction of the target intelligence effort of artillery agencies (ch. 9). His specific duties include—

a. Initiation of a systematic and coordinated search by all available collecting agencies for target information to include targets suitable for nuclear attack. To accomplish this, he must—

- (1) Coordinate, through the normal chain of command and through staff contacts, the work of artillery intelligence personnel in lower echelon artillery units, including the battle group artillery where appropriate. This includes the coordination of observation facilities, including Army aviation used for artillery observation, and the coordination of the artillery intelligence reporting system of lower echelon artillery units.
- (2) Maintain close liaison with the intelligence sections of higher, lower, adjacent, and supported units for the purpose of exchanging information and mutual assistance in the location of targets.
- (3) Foresee the need for, obtain, and distribute maps, photomaps, and aerial photographs.
- (4) Study and interpret aerial photographs when no photo-interpreter teams are available; supervise their activities when present.
- (5) Direct the operation of countermortar (division) and

counterbattery (corps) intelligence activities as described in chapter 10.

(6) Originate requests for reconnaissance missions by Air Force aircraft.

b. Collection, evaluation, and interpretation of information and dissemination of target information and intelligence in time for units to take appropriate action.

c. Keeping the artillery commander, staff (FDC), and subordinate units informed of the enemy situation and capabilities.

d. Close collaboration with the S3 (or FDO) on intelligence and operations matters.

e. Examination of maps, photomaps, and aerial photographs for reliability of control and dissemination of this information to subordinate units.

f. Preparation and distribution of intelligence reports.

g. Keeping the S2 situation map and any other records pertaining to the S2 section that the situation may require.

h. Furnishing pertinent data for inclusion in the command report.

i. Preparing a plan for and supervising the execution of counter-intelligence measures (FM 30-5).

j. Preparation of the artillery intelligence bulletin (corps and army artillery S2 only) for distribution of enemy information to higher, adjacent, and subordinate artillery commanders (to include battalions and separate batteries). The bulletins are prepared only as specifically required.

k. Supervising intelligence training for the artillery.

l. Informing the survey officer of all plans affecting survey requirements.

27. S3

The S3 of a field artillery staff (FDO of battle group artillery) is responsible to his commander for activities pertaining to organization, training, and operations. His duties are to—

a. Make recommendations to the artillery commander regarding the employment of artillery units.

b. Formulate plans as directed and prepare operation orders for the approval of the commander.

c. Keep the commander and staff informed of matters pertaining to training, combat efficiency, and disposition of artillery units.

d. Plan and supervise artillery training and operations.

e. Collaborate with other staff officers on matters affecting operations.

f. Prepare artillery fire plans.

g. Make recommendations for the employment of artillery nuclear weapons.

h. Coordinate and integrate artillery fire plans of lower echelon artillery units with each other and with the plan of operations (chs. 11 and 12).

i. Provide current information of artillery fire capabilities.

j. Keep the S4 informed to ammunition requirements.

k. Recommend allocations and reallocations of artillery units to subordinate commands.

l. Plan and supervise artillery liaison activities.

m. Keep current at FDC the information on the friendly tactical situation.

n. Obtain and distribute meteorological messages.

o. Keep the communication officer informed of all plans affecting signal communication requirements.

p. In cooperation with the artillery S2 of the next higher artillery headquarters, plan and supervise the work of intelligence personnel (in artillery units not authorized an intelligence officer).

q. Supervise the preparation of pertinent records and reports.

r. Exercise staff supervision over fire direction activities.

s. Inform the survey officer of all plans affecting survey requirements.

28. S4

The S4 of a field artillery staff is responsible to his commander for the coordination and supervision of all logistical functions of the organization. Although all S4's have the general duties outlined for the G4 in FM 101-5, there is a difference between S4's in respect to their echelon, the scope of their operations, and the assistance they receive in carrying out their logistical responsibilities. Artillery battalion S4's and airborne division artillery S4's are operating S4's; that is, they have the means at their disposal to procure and distribute supplies and, if necessary, to establish supply points. Non-operating S4's do not have the means to procure and distribute supplies. Therefore, they are concerned primarily with coordination and supervision. In addition to procurement and distribution (as appropriate), an S4's duties are to—

a. Prepare and supervise the execution of a plan for the timely supply of artillery ammunition (ch. 15).

b. Keep the commander and staff informed of the ammunition status of the command.

c. Keep appropriate records of the overall artillery ammunition status, the location of ammunition offices and ammunition supply points, and the available transportation.

d. Keep a current record of all traffic data and information on road nets.

e. Supervise all supply functions of the command to assure adequate procurement and proper distribution.

f. Keep a record of critical items of equipment and supplies.

29. Liaison Officer

The techniques of liaison is discussed in paragraph 36. The principal duties of a field artillery liaison officer are to—

a. Represent the artillery commander at the headquarters to which sent.

b. Keep the headquarters to which he is sent informed of the situation, plans, policies, and capabilities of the command he represents.

c. Keep his own headquarters informed of the situation, plans, policies, and capabilities of the command with which he establishes liaison.

d. Facilitate necessary coordination and cooperation between units.

e. Perform specific functions as directed.

30. Communication Officer

The principles and techniques of communication for field artillery are discussed in paragraph 37 and chapter 14. For details of signal communication, see the field manuals of the 24-series. The principal duties of the field artillery communication officer are to—

a. Advise and assist the artillery commander on signal communication matters.

b. Plan and recommend the unit communication system and exercise staff supervision of its installation and operation.

c. Obtain and distribute signal operation instructions (SOI) and standing signal instructions (SSI).

d. Prepare prearranged-message code and other authorized codes.

- e.* Assist lower echelon artillery units in procuring signal supplies.
- f.* Supervise communication training throughout the unit.
- g.* Recommend the location of key installations within the command post area.
- h.* Supervise the maintenance of signal communication equipment in his own and subordinate units.
- i.* Coordinate the use of existing and planned communication facilities with the communication officers of adjacent and supported units, and with lower echelon artillery units.
- j.* Advise the commander and staff on electronic countermeasures and antijamming techniques pertaining to communication.

31. Reconnaissance and Survey Officer

In the performance of his duties, the reconnaissance and survey officer is closely associated with the commander, S2, S3 (FDO of battle group artillery) and the survey officers of higher, lower, and adjacent units and headquarters. His specific duties include—

- a.* The preparation of a survey plan.
- b.* Obtaining survey control and carrying control to lower echelon artillery units (pars. 68 and 69).
- c.* Execution of the survey plan.
- d.* Conduct of reconnaissance for routes, position areas, and observation as directed by the commander.
- e.* Supervision of survey training within the command.
- f.* Continuous planning for future reconnaissance and extension of survey.
- g.* Close collaboration with the S2 and S3 (FDO of battle group artillery) is securing needed information on target location, observation, routes, and future position areas.
- h.* Exchanging survey data and information with the survey officers of higher, lower, and adjacent units and headquarters. This may include establishing a survey information center (par. 69).
- i.* Determination of the accuracy of available maps.

32. Army Aviation Officer

The principal duties of the Army aviation officer are to—

- a.* Supervise the operations of organic, attached, or supporting Army aviation.
- b.* Determine the requirements for and recommend the allocation of aircraft and aircraft supplies for his own section and lower artillery echelons.

- c.* Supervise and coordinate the selection, preparation, and operation of airfields for the command.
- d.* Recommend, plan for, and coordinate the employment of organic, attached, or supporting Army aviation for the command.
- e.* Maintain close liaison with Army aviation officers at higher, lower, and adjacent commands.
- f.* Supervise the training of Army aviation units organic or attached to the command.
- g.* Be responsible for implementation of air traffic control procedures, as prescribed by the army commander, and provide the air defense artillery units with position information and identification of aviation under his command or supervision.

33. Radar Officer

The duties of the radar officer are to—

- a.* Advise the commander and staff on all radar matters.
- b.* Advise and aid the S3 in organizing and supervising radar training programs.
- c.* Submit necessary reports and keep pertinent records.
- d.* Supervise radar maintenance.
- e.* Provide liaison on radar matters with higher headquarters.
- f.* Advise the commander and staff on radar coverage.
- g.* Advise and assist the S4 in the procurement of radar supplies.
- h.* Maintain clutter and coverage diagrams as appropriate.
- i.* Advise the commander and staff on electronics countermeasures and antijamming techniques pertaining to radar, and recommend to the S3 training measures on these subjects.

34. Other Staff Officers

Duties of other artillery staff officers, such as the chaplain and surgeon, are outlined in FM 101-5.

Section III. CONTROL AND COORDINATION

35. General

The efficiency with which artillery fires are employed depends on adequate control of artillery and coordination with the supported units. Artillery fires also require coordination with those of other fire and tactical support agencies. Various means by which necessary control and coordination are effected are discussed in paragraphs 36 through 40.

36. Liaison

a. General. Liaison (FM 101-5) is maintained between units to insure mutual understanding and unity of purpose and action. Liaison is usually accomplished by the exchange of information being carried out by a unit's representative visiting or remaining with another unit. Artillery liaison is established by the supporting unit with the supported unit and by the reinforcing unit with the reinforced unit and may be established between higher, lower, and adjacent units and headquarters. Liaison between lower and higher units and headquarters is established as directed by the higher commander and between adjacent units on the initiative of adjacent commanders or on orders from the common commander.

b. Command Liaison. Through personal contact, artillery commanders effect command liaison with supported and reinforced commanders. The liaison effected by commanders is maintained continuously by liaison officers furnished by the unit responsible for establishing liaison.

c. Liaison Officers. The liaison officer is the commander's personal representative to the unit with which liaison is established. The principal duties of an artillery liaison officer are listed in paragraph 29. Frequent changes of liaison officers are undesirable. However, in situations requiring prolonged absences, it may be desirable to change liaison officers so they may keep up with the current situation, plans, and policies of their own command.

d. Staff Liaison. Liaison duties are not restricted to specifically appointed liaison officers but may be performed by any staff officer or other designated officer. A staff officer making a staff visit to another headquarters is, in effect, performing liaison duties. Liaison between staff sections of one unit and the same or similar staff sections of an associated unit is desirable in the furtherance of cooperation and coordination between units. In effecting staff liaison, staff officers act only within the limits set by policies of the commander.

37. Communication

a. The communication facilities of the artillery are integrated into systems which afford the artillery commander means for controlling and coordinating the fires of his unit and those of subordinate units. The commander of each echelon of artillery is responsible for the installation, operation, and maintenance of the communication facilities of his command. The communication officer of each artillery unit exercises immediate staff supervision over the unit's communication facilities.

b. Artillery communication includes the employment of all avail-

able means to transmit orders, information, intelligence, and commands between artillery units and to establish liaison with supported, reinforced, and adjacent units. For details on artillery communication, see chapter 14.

38. Command Post

The need for concealment, dispersion, reliable communications, access routes, and other tactical considerations influence the selection of a location for a field artillery command post. However, the most important factors influencing the selection are the requirements to exercise control of subordinate artillery units, to plan fire support, and to be prepared to function as a force or supported unit command post in an emergency. The headquarters battery or headquarters element of field artillery is normally located near the FDC. The element that effects coordination of fire support is normally located at the command post of the force or supported unit to establish the fire support coordination agency or to effect necessary liaison on fire support matters.

39. Estimates of the Situation, Plans, and Combat Orders

Artillery commanders must plan for and recommend the assignment, attachment, organization, and employment of artillery. Additionally, as fire support coordinators, they must anticipate the requirements and coordinate and recommend the employment of other fire support means. To accomplish this, the artillery commander's estimate of the situation and his plan to provide the best possible fire support must be continuous. These plans, as approved, are incorporated into the instructions issued for the employment of the force. With each change in the situation, the artillery commander must re-examine all considerations involved and decide whether changes in fire support measures are advisable. This continuous process is carried on concurrently at successive echelons and in close collaboration with the force (supported unit) commander and his staff. A discussion of the techniques involved in the preparation of estimates of the situation, plans, combat orders, and standing operating procedures is contained in FM 101-5. For appropriate forms and samples, see appendix II.

40. Coordinating and Limiting Measures

a. Zones of Fire. Zones of fire are assigned to artillery units to effect control of fire laterally and in depth to best support the action of the supported unit. Lateral limits within which a unit must be able to fire are designated by points or lines. Zones in depth may be prescribed by assigning position areas or by prescribing minimum range lines and lines to be reached by all or part

of the firepower of a unit. Zones of fire are assigned with the tactical mission.

b. No-Fire Lines. The no-fire line is a line beyond which artillery units may fire without prior clearance from the direct support artillery or from the battle group artillery, providing no more than negligible effects occur short of the line. The location of the no-fire line is established by the direct support artillery commander in coordination with the supported unit commander or by the battle group artillery commander in coordination with the battle group commander. Division artillery is kept informed of the location of and changes to the no-fire line. Division artillery coordinates no-fire lines within the division sector and disseminates the location of the division no-fire line to all artillery units with the division, to all artillery units reinforcing the artillery of the division, to adjacent division artilleries, and to corps artillery headquarters. Corps artillery headquarters coordinates division no-fire lines and transmits the location of the corps no-fire line to corps artillery units, to the artillery of divisions of the corps, and to the adjacent corps. Direct support artillery or battle group artillery is authorized to fire short of the no-fire line in its own sector. Other artillery units must obtain clearance from the direct support artillery or battle group artillery concerned prior to firing short of the no-fire line. Before executing fire missions short of the no-fire line and near the boundaries of the supported units, the direct support artillery or battle group artillery *must* coordinate with the artillery unit supporting the affected, adjacent unit. If it is considered necessary, the division FSCC may establish a separate nuclear no-fire line based on recommendations from the battle groups, combat commands, or division artillery.

c. 0-0 Line. The 0-0 line is a line established by corps artillery (par. 65) as a means of coordinating in depth the search for targets. To the extent possible, the attention of intelligence agencies with the division is focused on the area short of the 0-0 line; that of corps artillery is focused beyond the line. This arbitrary division, however, is not intended to restrict the zones of observation or attack of targets. The line should be designated by terrain features. The location of the 0-0 line is changed as the situation develops.

d. Bomb Line. The bomb line is a line designated by ground forces, beyond which air attacks may be executed without clearances from the ground forces, providing no more than negligible effects from the use of nuclear or nonnuclear weapons occur short of the line. The bomb line must be easily identifiable by terrain features from the air and the ground to prevent confusion and accidental air attacks on friendly ground forces. The bomb line should be located

as near the forward elements as practicable but must be consistent with the safety of friendly troops. During an attack, the bomb line should be located sufficiently far out to prevent unnecessarily frequent changes. The division G3 air, after coordination with the fire support coordinator, submits the recommended location of the bomb line and changes thereto to the corps G3 air. The corps G3 air submits the recommended bomb line to the army G3 air. The field army is responsible for the establishment, dissemination of information concerning location, and movement of the bomb line. Targets so located that the use of nuclear or nonnuclear weapons in an air attack may result in moderate or severe effects short of the bomb line require clearance by the ground forces. An appropriate nuclear safety line may be established as an additional troop safety measure for each such attack.

e. Nuclear Safety Line (NSL). The nuclear safety line is a line used as a troop safety measure. The division artillery commander, as fire support coordinator for the division, is responsible for designating the nuclear safety line. When a battle group is operating independently, the battle group commander may be required to establish nuclear safety lines for those weapons employed in support of his unit. The nuclear safety line may be used to—

- (1) Designate the limits to which casualty producing effects of friendly nuclear weapons may be permitted to extend in the direction of friendly forces.
- (2) Designate an area wherein friendly troops must observe certain protective measures.
- (3) Limit the advance of friendly troops and prevent them from encountering casualty producing effects of friendly nuclear fires.

Section IV. ESTIMATE OF FIELD ARTILLERY REQUIREMENTS

41. Responsibility

a. The artillery officer of an echelon ordering or conducting an operation is responsible for making the estimate of the artillery requirements. In making this estimate, the artillery officer considers the eventual organization for combat and the practicability of assembling the necessary artillery and ammunition at the time and place desired. Lower echelon artillery commanders may assist in the preparation of the estimate.

b. Artillery estimates are made to determine the number and types of artillery units, the amount of ammunition required to support the contemplated operation effectively, and the allocations of units and ammunition to lower echelons.

c. Requirements for special operations are discussed in chapter 8.

42. Basis of Field Artillery Estimates

a. The minimum requirements are that sufficient artillery be available to—

- (1) Place the required mass of fire on important targets.
- (2) Attack effectively all enemy installations that affect planned operations during any anticipated phase.

b. The amounts and types of artillery required for an offensive action depend primarily on the plan of the commander and the type of enemy resistance expected. Generally, units making secondary efforts will be allotted only limited amounts of artillery in order to permit the massing of artillery on other fronts where decisive offensive action is contemplated.

c. The amounts and types of artillery required for a defensive action depend primarily on the capabilities of the enemy, the terrain, and the plans of the commander.

43. Estimate of Field Artillery Requirements

Field artillery requirements vary so widely that no fixed data can be furnished. FM 101-10 contains tables showing basic loads, and experience tables for expenditures of ammunition for various types of operations; these are of assistance in making initial artillery estimates. As a campaign progresses, accurate experience data applicable to the conditions encountered should be compiled by artillery commanders as a guide for the conduct of future operations. Among the factors that must be considered in estimating the number and types of artillery units and amount of ammunition required are—

a. Availability and known or expected extent of use of artillery nuclear delivery units and ammunition.

b. Availability and known or expected extent of use of nuclear weapons by other fire support agencies (Air Force, Navy).

c. Type of operation (attack, defense, delaying, special operation, etc.) and supporting fires.

d. Tentative plan of operation and tentative fire plans.

e. Terrain and weather.

f. Comparative strength of friendly and enemy forces, to include morale, training, and supply.

g. Assistance that may be expected from air bombardment, naval gunfire, reinforcing fires by tanks and air defense artillery, or other means of support.

h. Composition, tactics, disposition, and organization of enemy force.

- i.* Strength, types, and ranges of opposing artillery.
- j.* Enemy artillery techniques.
- k.* Time available and capacity of road net.
- l.* Front and depth of main and secondary attacks.
- m.* Ammunition available (quantity and type).
- n.* Allowance for losses during combat.
- o.* Types of enemy fortifications and defenses to be encountered.

44. Estimate of Ammunition Requirements

a. The factors affecting ammunition estimates are the same as those affecting the estimates for artillery weapons and units (par. 43). Estimates must be realistic and based on anticipated expenditures (ch. 15). A guide for making estimates, based on various types or phases of combat, is contained in FM 101-10. The information contained in FM 101-10 must not be considered as binding for units in combat. It is the responsibility of artillery commanders at all levels to maintain adequate records to permit development of ammunition requirement factors from actual experience data.

b. When the estimated ammunition requirements exceed the available supply, it is necessary to modify the anticipated or planned rate of expenditures. It may be necessary to modify, postpone, or abandon the contemplated operation depending on the supply at army or theater level.

CHAPTER 5

TACTICAL EMPLOYMENT OF FIELD ARTILLERY

Section I. PRINCIPLES OF EMPLOYMENT

45. General

Through the maneuver of artillery fire, commanders possess a powerful means of influencing the course of combat. Field artillery is capable of delivering fire over a zone of great width and depth, and of rapidly shifting and concentrating its fire without changing its position. The principles of war (FM 100-5) apply to artillery as to all other arms. The principles of mass, economy of force, surprise, and maneuver (flexibility) have special application in the case of artillery, as well as the factor of cooperation.

46. Cooperation

Artillery supports and protects the other arms by fire. In providing this support it is essential to know when, where, and in what form the other arms require it. Most of this information can be provided either by the commanders who are planning and directing the operation or by the troops who are in contact with the enemy. Close and continuous liaison is necessary between force (supported unit) commanders and their artillery commanders both in planning and throughout the battle. The integration of fire support, both nuclear and nonnuclear, such as air, naval gunfire, and artillery, requires coordination which cannot be accomplished without cooperation, in the absence of unified command.

47. Mass

The power tactical and technical employment of artillery fire power exploits the principles of mass and maneuver. Artillery weapons and units are not physically massed, rather artillery is employed to provide the maximum capability for massing its *fires* when and where they are required to support the action of the ground gaining arms. Means of achieving effective massed fires include the use of survey, transfer of fire techniques, and employment of nuclear weapons. A single nuclear weapon is capable of providing massed fire greater than anything heretofore known on the battlefield.

48. Maneuver

Mass and maneuver are interrelated. While mass implies the

ability to concentrate a large volume of fire on a single target, maneuver implies the capability to transfer and distribute fire rapidly from one point or area to another, over a wide frontage as the tactical situation dictates. Maneuver also implies the ability, inherent in the mobility of field artillery units, to displace rapidly as well as the capability of quickly altering the organization for combat (pars. 51-62) to pace the bulk of fires where needed. Maneuver, therefore, involves the control of massed firepower by the subordinate artillery commanders, who are in immediate touch with the situation in forward areas. This control must be freely delegated by superior commanders when speed is a primary consideration. Such flexibility of control is dependent on the speed and reliability of the communication system.

49. Economy of Force

a. Economy of force requires that artillery be employed in conformance with the principles of mass and maneuver. Furthermore, the coordination of artillery fires with the other means of fire support must be such that the full weight of the artillery is placed on those targets which cannot be engaged with equal or greater effect by other means.

b. Economy of force also implies that the effort allocated to any task shall not exceed that necessary to produce the desired effect. The ability of the artillery to fulfill its function depends ultimately on the availability of ammunition; unnecessary expenditures involve a waste of effort through the whole channel of supply from factory to weapon. Therefore, strict control of both nuclear and nonnuclear ammunition expenditures is a primary consideration in attaining true economy of force.

50. Surprise

The principle of surprise is as important to the employment of artillery as to that of any other arm. To artillery, surprise implies the instantaneous delivery of a high volume of fire on the enemy without warning. Means of achieving surprise include concealment and camouflage, night occupation of positions, use of temporary and dummy positions, adherence to rigid standards of survey, use of predicted fire and transfer of fire techniques, restrictions on registration, firing from unexpected directions and in unexpected volume, judicious employment of nuclear ammunition, and the avoidance of stereotyped methods.

Section II. ORGANIZATION FOR COMBAT

51. General

Organization for combat places each artillery unit in a tactical organization and assigns each unit a tactical mission or mission type order (pars. 58 and 59). Where the situation demands, artillery units may be attached to other forces to provide the required support.

52. Objectives in Organizing for Combat

In any given situation there will be many combinations that will meet the requirements of a workable organization for combat. A good organization for combat is one that fulfills the following objectives:

- a.* Furnishes adequate support for the supported unit.
- b.* Provides massed fires where required.
- c.* Makes maximum use of the available weapons according to their best capabilities.
- d.* Facilitates future operations.

53. Basic Considerations in Organizing for Combat

Certain considerations are applicable to all artillery echelons, and are basic to attainment of the objectives in organizing for combat. These basic considerations are as follows:

- a.* Mission of the force.
- b.* Plan of maneuver (offense).
- c.* Scheme of defense (defense).
- d.* Centralized versus decentralized control.
- e.* Capabilities of weapons.
- f.* Availability of suitable position areas.
- g.* Number and type of artillery units available.
- h.* Capabilities and limitations of current and planned tactical groupings.
- i.* Planned or anticipated operations.
- j.* Availability of other fire support agencies (Navy, Air Force).
- k.* Availability and expected extent of use of nuclear and non-nuclear ammunition.
- l.* Provision of continuous fire support.

54. Fundamentals in Organizing for Combat

a. Fundamentals governing the development of an artillery organization for combat at a specific echelon are obtained by a study of the basic considerations (par. 53) as they apply to that echelon.

Fundamentals derived in this manner simplify the task of developing an artillery organization for combat that fulfills the objectives mentioned in paragraph 52.

b. The following fundamentals in organizing artillery for combat apply to all echelons:

- (1) Artillery commanders at all echelons retain centralized control of their subordinate units (elements) when the tactical situation, distance between units, terrain, and communications make it possible. However, when these factors indicate the necessity, artillery commanders may decentralize control of their artillery by the assignment of appropriate tactical missions or by attachment of these units (elements) to supported echelons or to subordinate artillery echelons.
- (2) Artillery at all echelons is organized for combat to provide adequate fire support for units in contact with the enemy, weight to the main attack (offense), additional strength to vulnerable areas (defense), immediately available fire support with which the commander can influence the action, and adequate fire support for the reserve when it is committed. Nuclear weapons allocated to a commander which have not been further allocated provided formidable firepower with which the commander can influence the action. Such weapons may be considered as a portion of the reserve of the commander.

c. Other fundamentals in organizing artillery for combat have less widespread application. These fundamentals are covered in paragraphs 55 and 56.

55. Fundamentals in Organizing Battle Group Artillery and Division Artillery for Combat

a. In organizing for combat, battle group artillery and division artillery include attached units and apply the fundamentals mentioned in paragraph 54. The tactical employment and use of available Army aviation and available fires of reinforcing artillery receive careful consideration.

b. Division artillery considers its countermortar, flak suppression, harassing, and interdiction fires, and other programs of fires in organizing for combat.

c. Battle group artillery considers the battle group counterfire program in organizing for combat.

d. Divisional field artillery missile units are usually retained directly under division artillery control and assigned a mission of general support of the division. However, a division artillery missile

unit, or portion thereof, may be attached to a task force below division level when the task force is operating beyond the range of firing positions with the main body of the division.

56. Fundamentals in Organizing Corps and Army Artillery for Combat

a. In organizing for combat, army artillery and corps artillery apply the fundamentals mentioned in paragraph 54.

b. Corps artillery provides depth to combat with short and medium-range fires, and augments the fire support provided by the artillery with division. Corps artillery considers its counterbattery program and other programs of fires in organizing for combat. It also may recommend the tactical employment and use of army artillery fires in the corps sector.

c. Army artillery provides depth to combat with medium- and long-range fires, and augments the fire support provided by the artillery with the corps.

d. Army light field artillery battalions are usually attached to corps and, then, reattached to divisions or other subordinate units of corps. An appropriate tactical mission is then assigned by the controlling headquarters. A general support, general support-reinforcing, or reinforcing mission, is appropriate for these units.

e. Army medium and heavy field artillery battalions are usually attached to corps and, then, reattached to field artillery groups. A general support or general support-reinforcing mission is appropriate for these units. When it is necessary for a corps medium battalion to support a division with all of its fires, it is preferable for the corps artillery commander to attach the medium battalion to a division rather than to assign it a mission of reinforcing the division artillery.

f. Army very heavy cannon field artillery battalions are usually retained directly under Army artillery control, or attached to corps and retained directly under corps artillery control. A general support mission is appropriate for these units.

g. Army short- and medium-range artillery missile battalions are usually attached to corps. Short range field artillery missile battalions may be reattached to corps artillery groups or to a division. Appropriate missions for these units are general support; reinforcing; or general support-reinforcing.

h. Army long-range field artillery missile units are retained under army artillery control and assigned a mission of general support.

i. The field artillery observation battalion organic to each corps artillery functions more efficiently as a unit. Therefore, it is normally

retained under centralized control of corps artillery and given a general support mission. However, when corps operations are decentralized, the organization of the battalion permits the attachment of the observation batteries to divisions. Divisions normally assign a general support mission to attached observation batteries. When operating on extended frontages the capabilities of the battalion may be exceeded. This will necessitate employment to provide coverage of only selective portions of the front if additional observation battalion support can not be made available from higher echelons.

j. The searchlight battery organic to each corps artillery may be assigned a mission of general support or may be attached to a subordinate unit. Platoons or, in some cases, the entire battery may be attached to a division. Divisions may assign either a direct support or general support mission to attached searchlight units.

k. One corps artillery aviation company is organic to each corps artillery. The group flights of this company operate from airstrips in or adjacent to artillery group areas and under the operational control of the supported group commander. All or part of the corps artillery aviation company may operate from a base airfield directly under the operational control of the corps artillery commander.

l. Field artillery group headquarters are normally attached to corps and retained directly under corps artillery control. They may be attached to divisions along with several artillery battalions. Groups are normally given a general support or a general support-reinforcing mission.

m. Division artillery of a reserve division is usually employed in a general support or reinforcing role, modified if necessary (par. 62).

n. Battle group artillery of a reserve division may be attached to the division artillery of the reserve division and employed with the division artillery to support a division in contact. It may be attached to a division in contact, and further attached to the division artillery. It may be retained in reserve with its parent division. It normally is used in a reinforcing or general support-reinforcing role. Forward observer and liaison sections are normally left with the parent battle group to insure rapid employment of the battle group artillery when it is returned to its parent unit.

57. Formation of Tactical Groupings

The formation of tactical groupings is an important consideration in organizing for combat. Tactical groupings are based on attachments. The attachment of an artillery unit to a corps, divi-

sion, group, force, or another artillery unit makes the attached unit a subordinate element of the command to which attached during the period of attachment. The attached unit receives its mission and executes all orders from the command to which attached (par. 78).

a. Field Artillery Groups.

- (1) The field artillery group headquarters is capable of controlling 2 to 6 battalions.
- (2) Mixed calibers and types of weapons within a group add flexibility and are desirable. However, the weapons of a group should be compatible so they can be used properly in fulfilling the group mission.
- (3) Battalions are retained with the same group headquarters insofar as feasible.

b. Field Artillery Battalion (Battery) Groups. An artillery battalion (battery) group is formed when it is desirable for one artillery battalion (battery) to exercise control over one additional battalion (battery) to a degree greater than would exist under a reinforcing mission (par. 17). In that distance between units is also a factor of control, extended frontages or other conditions which create greatly increased distances between battalions will tend to decrease the number of battalions which can effectively be controlled by the group.

58. Support as a Mission Type Order

a. General. A force commander may direct the field artillery under his control to *support* a particular operation or, depending on the degree of control desired, may further delineate responsibilities by assigning one or more of the specific tactical missions of direct support; general support; reinforcing; and general support-reinforcing. It is normal for army, corps, and division artillery commanders to be directed to *support the attack*. This is a directive which gives the artillery commander flexibility to employ the artillery available to him in the manner best suited in his judgment to assist in accomplishing the force mission, within the guidance provided by the force commander. Lower echelon artillery commanders may be directed to *support* designated units if the situation requires a partial decentralization of control. In this case, the lower echelon artillery commander assigns missions to his subordinate units as the situation requires and makes subsequent changes to meet changing situations.

b. Responsibilities of Commanders.

- (1) Although there is not a fixed set of responsibilities inherent in the mission type order of support as with the

standard field artillery tactical mission, an infantry division artillery battalion assigned this order must accomplish the following requirements with respect to the supported force:

- (a) Provide a minimum of one 105-mm howitzer battery to reinforce the fires of the mortar battery of each committed battle group.
 - (b) Provide liaison and communication to the headquarters of supported unit(s).
 - (c) Position and displace subordinate batteries as required to provide artillery support.
 - (d) Respond with fire to requests for artillery support, forwarding requests beyond the battalion capabilities to division artillery FDC.
 - (e) Furnish forward observers as required.
 - (f) Establish OP's to observe the zone of action of supported unit(s), and in conjunction with battle group artillery commanders, coordinate observation within this zone.
 - (g) Assist in planning fires in support of the supported units (c below).
 - (h) Keep division artillery informed of position areas and tactical missions assigned to subordinate artillery units.
- (2) When a field artillery battalion is given the mission type order of "support," the division artillery commander may issue certain instructions in conjunction with the order which may amplify or modify the requirements as outlined in (1) above. Therefore, the division fire support plan must be studied in conjunction with the order to insure that all instructions issued by the division artillery commander are being complied with.

c. Effect on Fire Planning in the Infantry Division. Fire planning is normally accomplished at battle group artillery and division artillery levels. Since a supporting battalion is in between these two levels of command, it will not normally plan fires. The responsibilities of the support battalion commander for fire planning can best be discussed by considering two situations.

- (1) *When supporting one battle group.* The fires of a battalion placed in support of one battle group are considered as automatically allocated to the battle group for fire planning purposes unless otherwise specified by the division artillery commander. The supporting battalion then assists the battle group artillery by providing information and assistance in scheduling. The degree of assistance

will vary from providing a liaison officer from the reinforcing artillery battery to providing as much of the facilities and personnel of the battalion as necessary. The battle group commander may request the supporting battalion commander to coordinate his fire support. The battle group artillery fire plan will be sent directly to division artillery with an information copy to the supporting artillery battalion. In the defense, all 105-mm howitzer batteries of the supporting battalion are allocated to the battle group for scheduling of barrages.

- (2) *When supporting more than one battle group.* When a battalion is placed in support of more than one battle group, the division artillery commander specifically allocates the fires of batteries of the battalion for fire planning purposes and barrages. Additionally, the division artillery commander may specify priorities of fires. The supporting battalion coordinates the battle group artillery fire plans and may plan additional fires as specifically directed by division artillery. The coordinated battle group fire plans will be forwarded to division artillery by the supporting battalion. In the defense, each committed battle group will be allocated a minimum of one 105-mm howitzer battery of the supporting artillery battalion for scheduling of a barrage.

59. Tactical Missions

a. General. A tactical mission is the fire support responsibility that may be assigned to an artillery unit. Tactical missions that may be assigned to field artillery units are direct support; general support; reinforcing; and general support-reinforcing. The responsibilities inherent in each type tactical mission are illustrated in figure 5. Examples of various missions are shown in type orders in appendixes II and III.

b. Direct Support. Direct support artillery has the mission of supporting a specific unit of a command. When practicable, the supporting artillery unit is habitually placed in direct support of the same unit in order to facilitate teamwork. The direct support artillery commander maneuvers his unit to conform with the plan of the supported unit commander. Direct support artillery is not attached to the supported unit; it remains under the command of the higher artillery commander, but its fires are not taken away from the supported unit except by the authority of the division or force commander. This authority normally is delegated to the division artillery or force artillery commander.

c. *General Support.* General support artillery has the mission of supporting the force as a whole. An artillery unit with a general support mission remains under the command of the force artillery commander and provides the force commander a reserve of firepower with which to influence the action.

d. *Reinforcing.* Reinforcing artillery has the mission of augmenting the fires of reinforced artillery on call. Artillery with a reinforcing mission remains under the command of the higher artillery commander, but priority of fires is to the reinforced artillery. The reinforcing artillery establishes liaison and direct communication with the reinforced artillery in order to minimize the time required to answer calls for fire.

e. *General Support-Reinforcing.* General support-reinforcing artillery has the mission of supporting the force as a whole, and of providing reinforcing fires for another artillery unit. A unit with this mission displaces on order of the next higher artillery commander, or as requested by the reinforced unit subject to approval of the next higher artillery commander. However, the unit commander must be prepared to recommend actual position areas and to advise the higher artillery commander when displacement is necessary. Priority of fires is to the force as a whole unless otherwise specified by the force commander.

f. *Modification of Tactical Missions.* Tactical missions assigned artillery units may be modified; the modifications must be clearly stated by the commander assigning the mission. Since a tactical mission of direct support requires the full use of all elements of an artillery unit, it normally should not be modified. Frequently used modified missions include—

- (1) *General support, prepared for direct support*—A mission of general support, but the battalion commander must prepare for a probable future direct support mission by instituting the necessary planning, reconnaissance, liaison, selection of positions (when appropriate), communications, and survey.
- (2) *General support-reinforcing; revert to control of parent unit upon commitment or order*—A mission frequently given to a division artillery when its parent division is not committed and the division artillery is under corps artillery control. Necessary planning, reconnaissance, liaison, selection of positions, communications, and survey must be instituted early to provide effective fire support for the parent division when it is committed.

g. *Battle Group Artillery.* The artillery organic to a battle group

A field artillery unit with a mission of	Answers calls for fire from--	Establishes liaison with--	Establishes communications with--	Has the following zone of fire:	Must furnish forward observers--	Displace on order of--
Direct support	Supported unit. Own observers. Next higher hq.	Supported unit.	Supported unit.	Zone of action of supported unit.	For zone of action of each rifle or armor of company of supported unit.	Unit commander.* Next higher hq.
General support	Next higher hq. Own observers.	Not required unless directed by next higher headquarters.	Not required unless directed by next higher headquarters.	Zone of action of supported unit.	Not required unless directed by next higher headquarters.	Next higher hq.
General support (of battle group by organic artillery)	Parent unit. Own observers.	Parent unit	Not required unless directed by parent unit.	Zone of action of the parent unit.	For zone of action of each rifle company of parent unit.	Unit commander.* Next higher hq.
Reinforcing	Reinforced unit. Own observers. Next higher hq.	Reinforced unit.	Reinforced unit.	Zone of fire of reinforced unit.	As requested by reinforced unit.	Reinforced unit.* Next higher hq.
General support--reinforcing	Next higher hq. Reinforced unit. Own observers.	Reinforced unit.	Reinforced unit.	Zone of action of supported unit.	As requested by reinforced unit, subject to approval of next higher hq.	Next higher artillery hq or as requested by reinforced unit, subject to approval of next higher hq.

*Notifies next higher headquarters as to time and place.

Figure 5. Field artillery tactical missions.

provides continuous close fire support for the battle group. The battle group commander may retain it in general support of the battle group or place it in direct support of designated elements of the battle group. When the battle group artillery is retained in general support, its responsibilities are as shown in figure 5.

60. Assignment of Tactical Missions

a. Tactical missions for battle group artillery are normally recommended by the battle group artillery commander and assigned by the battle group commander.

b. Tactical missions for division artillery are normally assigned by the division artillery commander as approved by the division commander. However, a division artillery battalion commander with a mission type order of support (par. 58) may assign tactical missions to subordinate units as the situation requires and make subsequent changes to meet changing situations.

c. Tactical missions for corps artillery are normally assigned by the corps artillery commander as approved by the corps commander.

d. Tactical missions for army artillery are normally assigned by the army artillery commander as approved by the army commander.

e. Both corps and army artillery commanders assign tactical missions to the groups and separate battalions retained under their control. Ordinarily, they do not assign tactical missions to the battalions within a group. However, they may direct the group commander to assign a tactical mission to a battalion(s) of the group by caliber. This modifies the tactical mission assigned to the group (e.g., 102d FA Gp: GS-reinf 1st Inf Div Arty with one 155-mm how bn). In this case, the group commander assigns a general support-reinforcing tactical mission to one medium battalion of the group and a general support tactical mission to the other battalions of the group.

f. When a battalion within a group is given the tactical mission of reinforcing a division artillery, the tactical mission is assigned to the battalion by the corps artillery commander, the battalion is automatically relieved from the attachment to the group, and placed under command of the corps artillery commander with priority of fires to the reinforced division artillery.

g. A battery may be assigned a reinforcing mission without being withdrawn from control of the battalion.

h. Tactical missions suitable for various types of field artillery units are mentioned in appropriate field manuals of the 6 series and in paragraphs 55 and 56.

61. Zones of Fire

Normally, the zone of fire for battle group artillery and direct support artillery is the zone of action of the supported unit. Other artillery units are assigned zones of fire to insure complete artillery coverage and to provide for maximum firepower at points critical to the success of the operation.

62. Artillery With Reserve Units

a. As a general rule, artillery is not held in reserve, thus organic artillery of a division in reserve may be employed in support of the corps if it can be foreseen that the artillery will be able to rejoin its division when that unit is committed. Artillery of the division should be employed as general support or general support-reinforcing artillery. Plans for the utilization of the fires of these artillery units should be integrated with the overall artillery fire plan in such a way that the overall plan will not suffer a major disruption on their withdrawal. Organic artillery units of a reserve division must prepare plans to reassemble their subordinate elements so they can give timely support to the parent division when it is committed. If practicable, it is preferable to employ the artillery units of a reserve division as a group. Sufficient members of the artillery staff should be left with the reserve division to insure proper planning, liaison, and reconnaissance for future actions of the division.

b. The principles indicated in *a* above also apply to the employment of an artillery battalion or battery which normally supports a specific unit, when that unit is in division reserve. The battle group artillery of a reserve battle group should be employed in areas that will facilitate future operations of the parent battle group. Reinforcing or general support-reinforcing missions are preferable to a general support or direct support mission in these cases.

c. When a large mobile reserve is retained for possible employment over an extended frontage on short notice, or when the necessity for artillery replacement by unit is indicated or probable, it is usually desirable to retain artillery in reserve.

Section III. OBSERVATION

63. General

Artillery commanders utilize air and ground observation as a means of controlling and coordinating supporting fires and collecting information of the enemy. Observation provides information for friendly troops. It provides a means of adjusting and performing surveillance of artillery fires and of fires delivered by aircraft and naval guns. Each corps artillery has an organic field artillery ob-

servation battalion (par. 87). Artillery maintains observation throughout daylight and darkness. During darkness, observation is aided by various means of battlefield illumination (par. 86) and electronic devices such as radar (par. 64d). Artillery observation should cover the entire zone or sector of the supported unit. It is coordinated by assigning artillery units the zones of observation which normally correspond to their assigned zones of fire and by the designation of the 0-0 line (par. 40c). Careful attention must be given to coordination of observation along boundaries between adjacent units to insure complete coverage.

64. Means of Observation

a. Observation Posts. Observation posts (OP's) form the framework of ground observation and are an important adjunct to the air warning system (FM 44-8). They are established by artillery observers and surveyors to locate targets, to adjust fires, to provide surveillance of fires, and to maintain observation throughout the zone, including areas defiladed to forward observers. When appropriately situated and accurately located by survey, two or more of these OP's may function as a target area base. Target area bases are established and maintained by all divisional artillery battalions and corps medium battalions if the situation permits (FM 6-40 and TM 6-200). The surveyed locations of these OP's are reported to higher artillery headquarters in order that effective target areas bases can be established and coordinated across the force front. However, observation and adjustment of field artillery fires are not confined to artillery personnel; members of supported units often report the locations of targets and sometimes adjust fire thereon (FM 6-135).

b. Forward Observation. Direct support artillery furnishes a forward observer section for each infantry or tank company or similar organization committed to action by the supported unit. Battle group artillery furnishes observers for rifle companies of the battle group. Forward observers are principally concerned with the immediate surroundings of the supported unit, consequently their observation capabilities are directly related to the unit's mission and situation. The observers' ability to observe and his knowledge of the battlefield must be exploited to assist in keeping the units adequately informed at all times. Artillery units other than those organic to battle groups or with a direct support mission may also furnish forward observer sections. These sections function under the control of the organic or direct support unit.

c. Aerial Observation. Observers in aircraft are used to supplement ground observation and to exercise general surveillance over

the battlefield. Army aircraft organic to divisions and corps are employed for close-in surveillance. Long-range artillery may require aerial observation beyond the capabilities of Army aircraft; in which case reconnaissance aircraft of the Air Force are available on the request of the artillery commander (par. 173). For artillery adjustment and surveillance missions, performed by an Air Force observer, definite arrangements for the communication and technique to be utilized are made by the artillery unit concerned with the Air Force observer through the air-ground operations system.

d. Radar. Field artillery observation batteries (par. 87), armored division light field artillery battalions (FM 6-101), and infantry division artillery headquarters and headquarters battery are equipped with radar sets which under favorable conditions are capable of detecting and locating enemy artillery to an accuracy of 150 meters and mortars to an accuracy of 50 meters at a maximum range of 10,000 meters. Under favorable conditions, artillery radar is capable of registering and adjusting artillery fire. Heavy rain or snow and lack of suitable position areas for the radar sets will reduce the efficiency of radar. Radar when suitably sited may also be used to detect enemy movements.

e. Sound and Flash (Ranging). Sound and flash (ranging) are two distinct and separate but supplementary systems of locating enemy weapons and adjusting friendly fire by: observation by sonic devices on the sound produced by the enemy weapon in firing, or by the friendly projectile in exploding; or by visual observation of the flash produced or of the point of burst of the enemy weapon or friendly projectile.

f. Sound Ranging. Sound ranging is accomplished for the artillery by the observation battalion (par. 87). Sound ranging normally is capable of determining the locations of sound sources with an accuracy of 50 to over 150 meters at ranges up to 20,000 meters. Its greatest value is in locating artillery weapons which are hidden from visual observation. Sound ranging does not require a clear line of sight to the target, is particularly effective in fog or rain, and falling snow has no effect. High winds impair the accuracy of sound ranging. The maximum range is limited by the intensity of the sound. Battle group sound locating sets (FM 7-21) are also useful in locating mortars and direct fire weapons.

g. Flash Ranging. Flash bases are established by the observation battalion and abbreviated (01-02) flash bases can be established by most artillery battalions. Under favorable conditions flash ranging is the most accurate available means of target location and a valuable source of intelligence. Flash ranging is limited in its

effectiveness, however, by unfavorable terrain and weather conditions which impair visibility, and by enemy deceptive measures.

65. Coordination of Observation

Coordination of observation must be a continuous process at all levels of command to insure that complete coverage of the zone of operations is maintained. The artillery S2 (battle group artillery commander) coordinates all of the means of observation available to his commander. The plan of observation, like a fire plan, is prepared simultaneously at all echelons. Coordination of observation cannot be effected by the corps artillery S2 until he has the plans of observation of divisions within the corps. Necessary readjustments are made through the normal chain of command.

a. Field Artillery Group. The observation functions of the field artillery group S2 depend on the tactical mission assigned the group. If the group has a reinforcing mission, the coordination of observation is a responsibility of the reinforced unit; with a general support mission, the overall coordination of observation rests with the S2 of the artillery of the supported force or unit. In either case, the group S2 coordinates the observation facilities under group control, with the overall observation plan. His duties in this respect parallel those of the division artillery S2.

b. Battle Group Artillery. Coordination of observation within the battle group is effected by the battle group artillery fire direction officer (FDO). He must know the location of all observation posts within the battle group area. He determines the adequacy of coverage, weaknesses, dead spaces, and the need to augment or relocate observation facilities. He coordinates the observation of reinforcing artillery units and informs division artillery of ground and aerial observation requirements which cannot be met by the battle group. He provides the division artillery with visibility charts of ground OP's and with information concerning the battle group observation plan.

c. Division Artillery. The coordination of observation effected by the division artillery S2 requires analysis of, and the submission of appropriate recommendations concerning present and future observation requirements. Visibility charts of ground OP's and radar clutter and coverage overlays are studied by the S2 to determine the adequacy of coverage, weaknesses, dead spaces, and the need to augment or relocate observation facilities. He coordinates the observation facilities of the division, as well as those of units reinforcing the artillery with the division. This coordination may include—

- (1) Instructions concerning the number of observation posts and their general locations.

- (2) Assignment of zones of observation and areas of primary responsibility.
- (3) Employment of aircraft used by the division for artillery purposes.
- (4) Employment of sound ranging, flash ranging, and radar facilities.
- (5) Employment of other observation facilities which are made available to the artillery with the division.

d. Corps Artillery. The coordination of observation is effected by corps artillery S2. Coordination in depth, when considered necessary, is obtained by designation of an 0-0 line (par. 40c). Particular attention is directed to the areas along division and corps boundaries. Observers in the zone of one division frequently can see and adjust artillery fire on targets in the zone of another division. Observation for adjustment or surveillance of fire may be assigned to observers belonging to units other than the artillery units designated to fire. Army aviation is employed to supplement ground observation (par. 64c). While the technique of setting up flash, radar, and sound installations is left to the observation battalion, its attention should be directed into those areas most likely to contain enemy artillery. Provision may be made for direct communication between observation batteries and fire direction centers to facilitate delivery of fire on targets located by the observation batteries.

e. Army Artillery. Army artillery coordinates observation by participation in planning for the use of high-performance aircraft, special forces, and other agencies which have a capability for long-range artillery observation and target acquisition.

66. Battlefield Illumination

Illumination of the battlefield is a supporting mission and is a responsibility of the artillery. Illuminating shells, aircraft flares, and field artillery searchlights are used for illuminating the battlefield to facilitate night observation and provide assistance to infantry and armored unit's night operations. For employment of artillery searchlight batteries see FM 6-115 and paragraph 86.

Section IV. SURVEY

67. General

Artillery survey is the process of determining the relative horizontal and vertical locations of artillery weapons, targets, and target locating devices and of providing means of orienting weapons and equipment on the ground. Survey facilitates the massing of fires, the

delivery of observed fires without adjustment and the delivery of effective unobserved fires. Survey must be performed with appropriate accuracy and should be based on a carefully prepared plan with definite goals and priorities. The senior artillery commander is responsible for initiating the overall survey plan, establishing common control, disseminating survey information, and determining the accuracy of available maps. Commanders must allow for the time required for survey if support by accurate unobserved fire is expected. The time required depends on the control available, weather, enemy activity, and terrain. Inasmuch as forces may be employed over an extended area, survey operations at all echelons must be carefully planned to insure that survey control is established as expeditiously as possible.

68. Control

Common control is that control used by a unit as a whole; it may be either assumed control or true control, depending on the origin of the common grid.

a. Assumed control is survey based on an arbitrary height and grid reference for the starting point and an assumed or true direction. It should closely approximate true control in direction and height to permit use with met data.

b. True control is control that has been tied into the survey system (military grid) being used. These data are procured by artillery survey personnel from topographic engineers, existing maps, trig lists, or other lists of existing control.

69. Echelons of Survey

The higher echelon is responsible for extending survey control to the lower unit. However, survey is performed simultaneously in all echelons. Lower units commence survey from control points when these have been furnished by higher headquarters. When no control is available, survey is initiated based on assumed control and converted to true control when it is made available.

a. Field Artillery Group. The group does not perform survey. The group commander may assist his battalions in survey activities by procuring and furnishing survey data and by coordinating survey plans. Each battalion of the group ties its survey into the common control furnished by the artillery headquarters with which the group is working.

b. Battle Group Artillery. For a discussion of survey by battle group artillery, see FM 6-18 and FM 6-21. A detailed discussion of survey methods and techniques, duties of personnel, and survey planning is contained in TM 6-200.

c. *Division Artillery.* Division artillery extends corps survey control to each battalion or separate battery of the division artillery and to the battle group artillery. In the absence of corps control, division artillery extends common control to these units, tying into corps control when it becomes available. Division artillery establishes a survey information center (SIC) that serves the same purpose as the corps survey information center (*d* below).

d. *Corps Artillery.* The corps artillery survey officer is the observation battalion commander. The observation battalion (par. 87) normally furnishes common control to the field artillery units of the corps. Where true control is available, the observation battalion connects the corps survey to true control and makes the necessary conversion to place the entire corps on true control. The observation battalion, in addition to extending common control to artillery units with the corps, executes its own internal survey, and establishes a survey information center to maintain a record of all survey control available in the corps sector. All requests for control should be made to the survey information center and all survey data determined by units with the corps should be reported to it.

e. *Army Artillery.* Army artillery units, except as noted in *f* below, perform their own survey operations. This survey is tied in to true control which may be obtained from Army topographic engineers, a corps artillery, or available maps, trig lists, or other lists of existing control. Units requiring survey control of a higher order of accuracy than that furnished by a corps observation battalion are furnished survey support by special army engineer teams.

f. *Air Defense Artillery Units.* When an air defense artillery unit is assigned a surface mission, it must be provided complete survey data. When assigned an air defense mission, but in position to augment the fire of a field artillery unit, the air defense artillery unit will use survey data supplied by the field artillery unit.

Section V. MANEUVER OF FIELD ARTILLERY UNITS

70. General

This section discusses the movement of artillery *units* as opposed to the maneuvering of artillery *fires* which is discussed in chapter 13. The artillery commander is responsible that his units are so maneuvered that they are able to render effective support in all situations. This requires—

a. That the artillery's characteristic of mobility be zealously maintained (par. 71).

b. That all artillery commanders keep abreast of plans of the

supported units (pars. 35 and 36) and anticipate requirements for artillery (par. 41).

c. Proper organization for combat, necessary changes thereto during the operation, and decentralization of control when appropriate (pars. 51-62).

d. Coordinated movement of artillery units and proper employment of artillery during marches and with security detachments (pars. 72 and 73).

e. Selection of position areas (par. 74) from which effective artillery fire can be delivered.

f. Continuing reconnaissance (par. 75) for position areas, observation posts, locations for other installations, and routes.

g. Timely displacement (par. 76) of artillery units to provide continuity of fire support.

h. Sound procedures in effecting relief of artillery units in combat (par. 77) and in the reception of attached artillery (par. 78).

i. Effective security measures (par. 79).

71. Mobility

a. Mobility is a prime requisite of field artillery units. It is obtained by applying an effective system of maintenance and operation to the unit's organic transportation (FM 6-101 and FM 25-10).

b. The commander of each echelon of artillery is responsible for the operation and maintenance of the transport of his unit. The prescribed standards of vehicle operation and maintenance can be maintained only by close supervision. The execution of this function may be delegated to the motor officer but the responsibility remains with the commander.

72. Movements

a. *References.* For the basic doctrine governing troop movements, see FM 100-5; for technical and logistical data and march tables, FM 101-10; for march orders, FM 101-5; for detailed treatment of motor movements, FM 25-10; for details of marches of field artillery battalions, FM 6-101; and for a discussion of air defense artillery protection, FM 44-2 and FM 44-4.

b. *Tactical Marches.* When a force is marching in multiple march columns, artillery is placed within each column to insure its availability for early and adequate support of the security forces and of the initial action of the main body. Artillery in each march column may be placed under the command of the column commander; command reverts to the force artillery commander when

control can be effectively centralized. This is accomplished on order of the force commander. Artillery reconnaissance, survey, observation, and liaison personnel march with forward elements of the column. When the rate of march of the column is that of dismounted troops, the artillery marches by bounds.

c. Air Defense Protection. The march column requires continuous air defense protection. This protection is obtained by dispersing self-propelled light air defense artillery fire units throughout the column within mutually supporting distance of each other.

73. Artillery With Security Forces

A military force in movement secures itself by reconnaissance elements (covering forces) operating in front of the command and by advance, rear, and flank guards when appropriate (FM 100-5). Self-propelled artillery is desirable for the support of all security forces.

a. Covering Forces. Covering forces should be strong in artillery. When not organic to the covering force, artillery units usually are attached to it. For the artillery to occupy position promptly to support the action, planning and reconnaissance must be continuous. The artillery is located so that it can enter action promptly and so other elements of the covering force can protect it from surprise attacks. To accelerate the opening of fire, minimum survey and communication is used.

b. Advance Guard. Artillery support for the advance guard (FM 6-101) is furnished by the attachment of an artillery unit to, or by artillery marching with, the advance guard. If the advance guard is small and within range, artillery support may be furnished by artillery with the main body. The amount of artillery attached depends on the mission and size of the advance guard and expected enemy action. The location of the artillery and the performance of reconnaissance is similar to that for covering forces. Speed in the occupation of position and in the attack of targets is essential. When contact is imminent, the artillery supporting the advance guard moves by bounds from one firing position to another.

c. Rear Guard. The mission of the rear guard requires the support of light and medium artillery and sometimes longer range artillery. Artillery with the rear guard is usually attached. The employment of the artillery is similar to that with the advance guard. The artillery occupies positions close behind each of the successive rear guard delaying positions. Fire is opened early to force the enemy to deploy and thus delay his advance. Roads, road junctions, and key terrain features are taken under interdiction fire. Some of the artillery is displaced early to allow continuous

fire and to support the withdrawal of the rear guard to its next delaying position.

d. Flank Guard. Artillery support for the flank guard is usually furnished by artillery with the main body. However, if the size of the flank guard is large and it is operating at a considerable distance from the main body, artillery is attached to it. The employment of artillery attached to the flank guard is similar to that with the advance guard.

74. Position Areas

a. General. The location of artillery position areas is governed mainly by the mission, the terrain, the nature of the tactical operation, and the need for dispersion as a defensive measure against enemy nuclear weapons. Artillery commanders may have to delineate areas for the location of major elements of their commands in order to coordinate the position areas with the operation. Usually battle group artillery and direct support artillery have priority for positions within the division area and division artillery units have priority over corps artillery units for positions within the corps area. Corps artillery units have priority over army artillery for positions within the army area. Special requirements may necessitate special priorities. For a discussion of field artillery battalion and battery position areas, see FM 6-101 and FM 6-140.

b. Responsibility. Battle group artillery and direct support artillery commanders normally select their own position areas subject to approval of the next higher headquarters. Position areas for general support units are selected (par. 75) by the force artillery commander and may be selected for reinforcing artillery units by either the force artillery commander or by the commander of the reinforced unit. Corps and army artillery position areas within the division area are coordinated with the division artillery commander concerned; army artillery position areas within the corps area are coordinated with the corps artillery commander concerned. Artillery commanders coordinate the selection of positions for both field and air defense artillery units. All artillery commanders should be aggressive in searching for position areas and be prepared to make recommendations to the commander responsible for selection.

75. Reconnaissance

Reconnaissance is a directed effort in the field by military units to gather information of the enemy, weather, and terrain. Artillery reconnaissance consists of target reconnaissance, which is a part of target intelligence (ch. 9), reconnaissance for positions, reconnaissance by fire, and route reconnaissance. Reconnaissance for positions involves a search for all appropriate locations for artillery

installations, such as firing positions, command posts, and observation posts. For a discussion of reconnaissance by fire, see below. Route reconnaissance is made prior to any movement of artillery units and involves a search for all potential displacement routes. Artillery reconnaissance is active and continuous. It is planned with a definite object in view and decentralized when time is short.

a. Responsibility. Artillery commanders at all echelons, regardless of their assigned tactical mission, are responsible for performing continuous route and position area reconnaissance and for making recommendations pertinent thereto. Reconnaissance personnel must determine what information is desired and carefully plan their activities so that reconnaissance may be completed in time for the information to be of use. Aerial observers, liaison officers, forward observers, communication personnel, and survey parties habitually report on routes within the zone of advance.

b. Reconnaissance Means. Artillery commanders use every means at their disposal to secure the information they need. Liaison with other units often precludes the necessity for lengthy reconnaissance. Reconnaissance may be performed by any of the following means or combination thereof:

- (1) *Maps.* Position area and route reconnaissance are initiated by the use of maps. Map studies are particularly valuable in planning a reconnaissance but can seldom be used as the only source of information.
- (2) *Aerial photographs.* Aerial photographs may be used in the same manner as maps for position area and route reconnaissance. Recent aerial photographs indicate current terrain conditions.
- (3) *Air.* Aerial reconnaissance may be performed by Army aircraft or by Air Force or Navy reconnaissance support. Army aircraft, particularly the rotary-wing type, are an especially valuable aid to reconnaissance. A map or map substitute reconnaissance should precede reconnaissance by air.
- (4) *Ground.* Ground reconnaissance is performed by all commanders, their staffs, and observation and reconnaissance personnel. A ground reconnaissance should be made of position areas prior to occupation and of routes prior to their use. Ground reconnaissance is preceded by a map study and is organized so it may be performed in the minimum time.

c. Reconnaissance By Echelon. Each echelon must execute reconnaissance to obtain information pertinent to the employment of

units of that echelon. Reconnaissance is coordinated between artillery echelons by the senior artillery commander concerned.

- (1) *Field artillery group.* Field artillery groups perform necessary reconnaissance to select position areas for their battalions and command installations after a general position area and mission have been assigned by higher headquarters. When applicable, the reconnaissance is coordinated with the unit whose fires the group is reinforcing. The group also performs necessary route reconnaissance for movement of the group.
- (2) *Battle group artillery.* The battle group commander in certain situations may designate general position areas for the battle group artillery. However, the battle group artillery commander is responsible for performing position area and route reconnaissance. Position areas and routes selected are reported to battle group headquarters and to division artillery. Coordination of battle group artillery position areas and position areas for attached or reinforcing artillery is a responsibility of the battle group artillery commander. Battle group artillery performs extensive target reconnaissance (ch. 9).
- (3) *Division artillery.* Division artillery selects general position areas and routes for movement of subordinate general support units, for units reinforcing the division artillery, and may select them for direct support units. Direct support artillery commanders are responsible for performing their own position area and route reconnaissance. Position areas and routes so selected are reported to division artillery. Although position areas and routes of movement for subordinate general support units are selected by division artillery, general support battalion and separate battery commanders perform continuous position area and route reconnaissance in order to be prepared to recommend areas and routes, and to facilitate displacement when ordered by division artillery. Division artillery also performs extensive target reconnaissance (ch. 9).
- (4) *Corps artillery.* Corps artillery directs continuous and aggressive target reconnaissance (ch. 9). Normally, corps artillery headquarters assigns general position areas and routes to groups and separate battalions based, when possible, on preliminary ground reconnaissance and a study of maps and fire capabilities. Necessary additional reconnaissance is left to group and battalion commanders.
- (5) *Army artillery.* Army artillery arranges for continuous

and aggressive target reconnaissance (ch. 9). Normally, army artillery headquarters assigns general position areas and routes to groups and separate battalions retained under army control based, when possible, on preliminary ground reconnaissance and a study of maps and fire capabilities. Necessary additional reconnaissance is left to group and battalion commanders.

d. Reconnaissance By Fire. Reconnaissance by fire is used to find targets, when enemy activity is so restricted as to make little or nothing visible. It is a method of probing suspected areas by fire to produce enemy reaction. Available observation is coordinated to detect any signs of activity that result from the fire. In some situations reconnaissance by fire may be utilized to determine the nature of a fortification. This must be closely coordinated with observation and the comparison of air photographs. Firing on the suspected areas may strip away natural cover, earth, and camouflage. This fire may establish the presence and thickness of concrete or armor, the outlines of the fortified structure, the location and direction of fire of embrasures, the system of tactical coordination, and the location of strong points.

76. Displacements

Timely and rapid displacements of field artillery units are necessary to provide continuous fire support. Fire support is maintained during displacements by displacing units by echelon or by using other artillery units to answer calls for fire. Displacements are accomplished as rapidly as possible so that fire can be resumed with a minimum of delay and to lessen the probability of the displacing unit's detection and attack by the enemy. When possible, command posts are displaced by echelon to insure continuity of control. Initial communication is installed and operations are begun at the new command post location prior to displacement of the old command post. When possible, survey should be completed before displacement is begun. Prior to the beginning of an action, units may displace to positions during darkness or inclement weather to avoid detection by the enemy. Thereafter, displacements are made depending on the progress of the supported unit or force. Normally, many considerations, such as the immediate situation, overall plan of operations, effective range of weapons, terrain, difficulty in maintaining communication, and availability of position areas and routes, will influence each displacement. All artillery commanders are responsible for continuous reconnaissance for position areas and routes, for keeping themselves abreast of the situation, and for making recommendations to the appropriate headquarters when displace-

ment becomes necessary. As shown in figure 5, authority for displacement of field artillery units varies with the tactical mission assigned the unit.

77. Relief in Combat

a. *General.* Relief in combat is of two general types: relief in place and passage of lines (FM 100-5). Neither type of relief presents any serious difficulties for the artillery. If the relieving artillery is to occupy positions other than those of the artillery being relieved, the relief is accomplished in a manner similar to that used during reinforcement in combat. If the relieving artillery is to occupy the positions of the artillery being relieved, the relief entails more detailed planning and cooperation between incoming and outgoing artillery units. During the course of the relief, the artillery maintains its normal fires and is prepared to execute counterbattery and protective fires in the event of an attack by the enemy. Relief is made at night, when possible, to maintain secrecy.

b. *Warning Orders.* When a relief in place or a passage of lines is to be made, warning orders are issued by the commanders of the next higher headquarters, the relieving unit, and the relieved unit. Warning orders should include the hour the movement for the relief is to begin and end, the zone of operation of the relieving unit, and any restrictions imposed upon reconnaissance parties.

c. *Reconnaissance.* Prior reconnaissance and consultation on details are necessary, but may be limited by the amount of time available. Time permitting, the relieving unit commander, staff, and subordinate commanders should make personal reconnaissance and confer with their opposite members of the relieved unit in order to reach agreement on details of the relief.

d. *Responsibilities.* The unit being relieved is responsible for furnishing the relieving unit with such of the following as are applicable:

- (1) Friendly situation including location of units and installations, no-fire line, 0-0 line, nuclear safety line, and OP's.
- (2) All available information of the enemy.
- (3) Information on routes and road guides, if necessary.
- (4) Survey information.
- (5) Location of supply installations.
- (6) Location of other artillery units within supporting range and means of communicating with them.
- (7) Any restrictions on firing or movement.
- (8) Existing wire circuits and wire line route maps.

- (9) Information necessary for fire control including fire plans, situation maps, and other information pertaining to operations in that area.
- (10) Authorized ammunition in excess of basic load or other allowance (applicable only to relief in place).
- (11) Any other information which may be pertinent.

e. Command.

- (1) *The principle of one responsible commander must be adhered to during the execution of a relief in place (FM 100-5).* When the artillery and the supported unit are being relieved during the same period, the artillery command passes from the relieved artillery commander to the relieving artillery commander simultaneously with the passage of command from the relieved supported unit commander to the relieving supported unit commander (FM 6-101). When the artillery and the supported unit are being relieved at separate times, the artillery command passes from the relieved artillery commander to the relieving artillery commander upon the direction of higher headquarters.
- (2) When a relief by passage of lines occurs, the incoming artillery commander usually becomes responsible for the artillery support prior to the beginning of the operation. This may be achieved by attaching the outgoing artillery to him or by assigning the outgoing artillery a mission of reinforcing him. In any event, the outgoing artillery supports the passage of lines from its original positions only until such time as the relieving supported unit passes beyond its range, then its status of attachment or mission of reinforcement normally ceases.

78. Reception of Attached Artillery

a. General. The presence of additional artillery on a battlefield may be an index of more active operations. Artillery supporting a battlefield should be moved up at night whenever practicable and with utmost secrecy.

b. Attachment to Other Artillery Headquarters. Artillery units of platoon, battery, battalion, group or division artillery size may be attached to other artillery headquarters. The attached units are given orders similar to those given to organic units, which state their mission, position areas, and routes.

c. Attachment to Organic Battalion (Battery). When an artillery battalion (battery) is attached to an organic battalion (battery),

the commander of the organic unit is designated as the battalion (battery) group commander (pars. 9 and 17). He is responsible that complete preparations are made for the reception of the attached battalion (battery). As a minimum, the battalion (battery) group commander's responsibility for the attached battalion (battery) includes—

- (1) Selection of position area.
- (2) Designation of route into position and time of occupation.
- (3) Furnishing survey information.
- (4) Communication arrangements between battalions (batteries).
- (5) Furnishing information concerning—
 - (a) Enemy and friendly situation.
 - (b) Fire direction SOP's, firing, and other special instructions concerning fire direction.
 - (c) Communication.
 - (d) Administrative and logistical support.
- (6) Instructions for liaison and observation requirements.

79. Security

a. *General.* Imagination and resourcefulness in the employment of security measures is necessary to maintain effective artillery fire against an enemy strong in artillery and tactical air or skilled in infiltration and guerilla tactics. Successful deception contributes to effective security. Deceiving the enemy as to the amount of friendly artillery assists the command in effecting surprise in launching an attack. For active and passive defensive measures of the artillery battalion and batteries in position and on the march, see FM 6-101 and FM 6-140.

b. *Movements.* Secrecy in moving artillery units into position may be gained by night marches and by infiltration. Detailed staff planning and coordination are necessary to avoid confusion and delays.

c. *Deceptive Measures.* Any deceptive measures employed by lower commanders must conform to the mission and counterintelligence plan of the higher commander.

- (1) Dummy positions are employed to deceive the enemy as to the true location of artillery units. These positions are constructed to appear as realistic as possible. Logs, captured weapons, and pneumatic devices may be used to simulate artillery positions. The appearance of digging, vehicle tracks in and around the position, and actual and simulated firing add to realism. Dummy positions should

be located so that resulting enemy fire will not damage friendly installations.

- (2) There are many other deceptive measures that may be taken. Artillery may occupy temporary positions and fire from them for short periods of time before moving back to the primary position. The firing of roving guns from surveyed positions for registration purposes and for harassing and interdiction missions is effective. Simultaneous firing by many units makes it difficult for the enemy to locate individual positions. The curtailment of fires, elimination of artillery preparations prior to attacks, restrictions on registrations, and the imposition of radio silence or other restrictions on radio operation, all help to conceal the presence of artillery in a given area.

Section VI. AUXILIARY WEAPONS

80. General

a. When directed by the appropriate commander, the fires of auxiliary weapons are used to supplement the fires of field artillery units. Examples of auxiliary weapons suitable for use in the field artillery role are tanks, light, medium, and heavy air defense artillery guns, air defense artillery missiles, and armored amphibians. For maximum effect when employed in a field artillery role, units with such weapons should be capable of employing massed fire techniques and should be connected to field artillery by survey, liaison and communication.

b. The employment of auxiliary weapons as field artillery is facilitated by assigning the unit a mission of reinforcing a field artillery battalion which has the means readily available for assisting the reinforcing unit. Those air defense artillery units trained and equipped to function as field artillery may also be assigned general support missions (par. 59).

c. The commander of the reinforced artillery unit is responsible for the coordination and employment of all available resources of both the reinforced and the reinforcing unit to enable the reinforcing unit to accomplish its mission in an auxiliary role. This may entail assistance to the reinforcing unit in any or all of the following:

- (1) Designating general position areas.
- (2) Arranging for aerial observation and supplementing ground observation as required.
- (3) Furnishing necessary survey.

- (4) Assigning missions and preparing firing data when applicable.
 - (5) Providing communication for the reinforcing unit, if necessary.
 - (6) Assisting with refresher field artillery training.
- d. The reinforcing unit will usually be responsible for the following (if within the unit's capability) :
- (1) Establishing communication.
 - (2) Procuring ammunition and supplies.
 - (3) Establishing liaison with the reinforced artillery unit.
 - (4) Furnishing forward observers when requested by the reinforced unit.

81. Tanks

Tank units with a mission of reinforcing the fires of field artillery normally remain under the command of the unit to which they are assigned or attached. When employed in field artillery roles, they are assigned fire missions suitable for the flat trajectory weapon with which they are armed (see FM 6-40).

82. Air Defense Artillery

Although air defense weapons are primarily designed to engage air targets rather than surface targets, they have the capability of being utilized in the surface-to-surface role. The exploitation of this surface-to-surface capability requires a command decision, based on the relative need for retention of air defense artillery units in the air defense role and for surface fires. In a surface mission, air defense artillery unit(s) may be employed as follows:

- a. To engage surface targets (ground and waterborne).
- b. To provide fire support to other combat units.

83. Armored Amphibians LVT (A), LVTH

The armored amphibians LVT (A) and the LVTH are landing vehicles armed with a 75-mm howitzer and 105-mm howitzer, respectively. Although designed for close support of a landing force, units equipped with these vehicles can also function as field artillery. When employed as field artillery, these units may be either attached to a field artillery unit or given a reinforcing mission (ch. 8).

84. Howitzer Companies

Each squadron of the armored cavalry regiment has an organic howitzer company which is similar in composition and equipment to the firing batteries of self-propelled 105-mm howitzer battalions.

Although this company will seldom be available to the artillery, it may, on occasion, be used to supplement field artillery fires. Improvisation is necessary if it is desired to employ the three howitzer companies of the armored cavalry regiment as a field artillery battalion, since they are not organized to function together as an artillery battalion.

Section VII. FACTORS AFFECTING THE EMPLOYMENT OF CERTAIN TYPES OF FIELD ARTILLERY UNITS

85. General

Not all field artillery units are employed in the same manner. Certain units differ in the tasks they are designed and equipped to perform. The employment of these units is discussed in paragraphs 86 through 90.

86. Field Artillery Searchlight Battery

a. Characteristics. The field artillery searchlight battery is organic to corps artillery and is organized so that it may be attached to division, either as a battery or by platoon, depending on the illumination requirement (FM 6-115). In addition to the normal headquarters, administrative, and maintenance elements, the searchlight battery contains three platoons of six 60-inch searchlights each. This battery has no liaison section and only limited facilities for survey, communication, and security. Therefore, existing artillery facilities are used by the searchlight battery as far as possible, and higher and adjacent artillery units may expect to receive requests from searchlight units for additional assistance.

b. Command. The searchlight battery commander acts as the searchlight adviser to the corps artillery commander, who, in turn, advises the corps commander in the use of searchlights, units to be supported, areas to be covered, times of employment, and other matters pertaining to the overall illumination plan. When a searchlight platoon or the entire battery is attached to a division, the searchlight unit commander acts as the searchlight adviser for the division artillery commander.

c. Planning. Effective employment of searchlights for battlefield illumination depends on thorough and coordinated planning. Commanders of supported units consider illumination capabilities in planning night operations, and the illumination plan is integrated into the fire support plan. Illumination plans must be formulated early enough to permit daylight reconnaissance for searchlight positions, installation of an adequate communication network, and sur-

vey control where applicable. The development of the illumination plan parallels artillery fire planning. Final coordination of the illumination plan is accomplished at corps artillery to insure integration of searchlight illumination with fire support means (e.g., target marking) and with other means of illumination (e.g., illuminating shells and aircraft flares).

d. Employment.

- (1) A searchlight battery may be assigned a tactical mission; it may be attached to a subordinate unit; or it may be given a special assignment.
 - (a) For a discussion of tactical missions, see paragraph 59.
 - (b) When attached to a division, a searchlight unit is usually reattached to division artillery headquarters. Normally, one searchlight platoon is sufficient to provide the illumination required in the sector or zone of action of a division. Attachment of a platoon to the division artillery headquarters, therefore, permits utilization of such existing artillery facilities as liaison, survey, and communication.
 - (c) Elements of a searchlight battery may be attached to an appropriate headquarters for special tasks, such as illumination of a construction site.
- (2) Position area requirements for indirect illumination by searchlights are similar to those for artillery. For direct illumination, the positions are selected to give line of sight coverage of the target area and are sufficiently close to the target area to permit complete coverage by the searchlights employed. Position areas are coordinated by the corps artillery commander or, when searchlights are employed in support of a division, by the division artillery commander. Indirect illumination (artificial moonlight), is achieved by diffusion of the searchlight beam (fig. 6) or by reflection from cloud cover (fig. 7). Satisfactory reflection is gained with as little as 60 percent cloud cover. Reflection produces more illumination than diffusion; with low hanging cloud cover, the illumination is nearly equivalent to that of a full moon. Direct illumination (fig. 8), is a special purpose use of searchlights which produces maximum illumination of targets. Searchlights may also be used to illuminate job sites and to serve as a homing beacon for army aircraft. Illumination by searchlights is affected by atmospheric conditions; dense fog, heavy snowfall, or heavy rain render the illumination totally ineffec-

tive. Natural moonlight decreases the effectiveness of illumination as does mountainous terrain.

- (3) For additional details of searchlight battery employment, see FM 6-115.

87. The Field Artillery Observation Battalion

a. One observation battalion, consisting of a headquarters, headquarters and service battery, three identical observation batteries, and a medical detachment, is organic to each corps artillery. Headquarters and service battery has personnel and equipment for survey

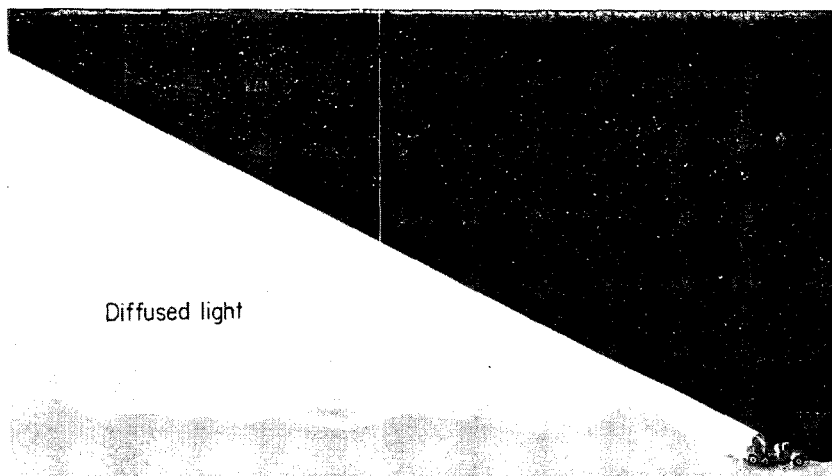


Figure 6. Illumination by diffusion.

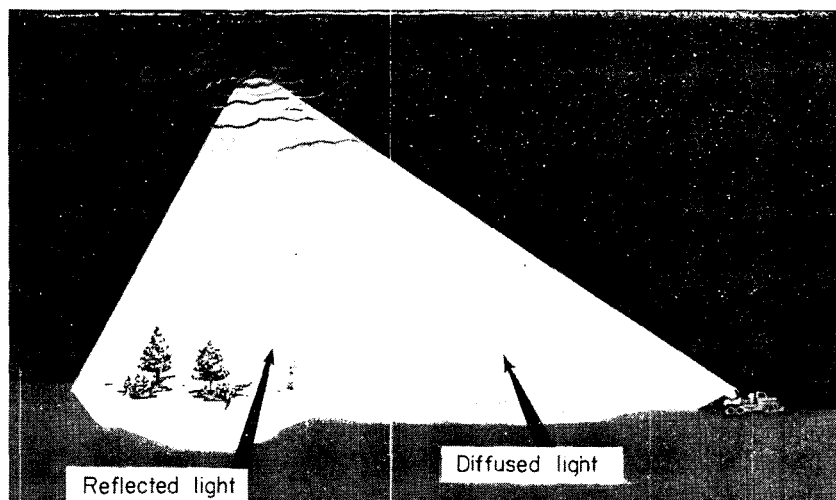


Figure 7. Illumination by reflection.

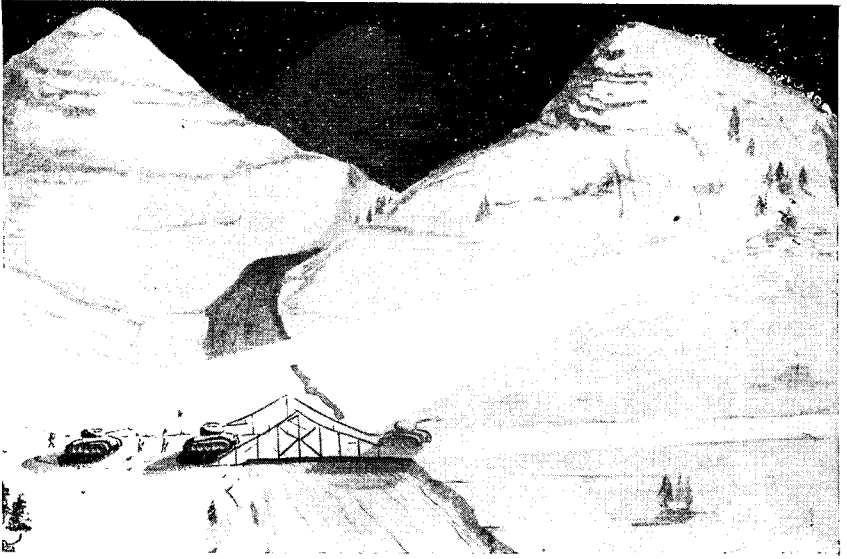


Figure 8. Direct illumination.

and meteorological operations. Each observation battery has the necessary survey, flash ranging, sound ranging, and radar equipment and personnel to operate independently of the battalion.

b. Seven missions performed by the observation battalion are the—

- (1) Acquisition of targets, with particular emphasis on the location of hostile artillery.
- (2) Registration and adjustment of fire of friendly artillery.
- (3) Conduct and coordination of corps artillery survey operations.
- (4) Collection and reporting of combat information.
- (5) Comparative calibration of friendly artillery.
- (6) Preparation of meteorological data and transmission to artillery units.
- (7) Surveillance of friendly artillery fires, to include the location of friendly nuclear bursts and determination of their yields.

c. Technical considerations involved in the employment of observation units should be left to the unit commander who advises higher headquarters on the capabilities and limitations of his unit under existing conditions. The battalion operates more efficiently under centralized control and, therefore, is usually assigned the tactical mission of general support. When centralized control is not feasible, the batteries may be attached to divisions or task forces.

For capabilities and limitations of the observation battalion and batteries, see FM 6-120.

88. Cannon-Type Nuclear Field Artillery

a. General. Cannon-type nuclear field artillery is particularly useful at the division and corps level. An understanding of the capabilities and limitations of cannon-type nuclear field artillery will enable the higher commander to employ both his cannon and missile nuclear artillery more effectively.

b. Capabilities. Although the exact capabilities vary with the type of weapon, the following capabilities apply to all types of cannon nuclear artillery:

- (1) It is the most accurate fire support means available for the delivery of nuclear weapons.
- (2) It can provide effective delivery of large numbers of non-atomic projectiles of various types.
- (3) It has a shorter minimum range than most types of missile field artillery.
- (4) It is less easily identified and located than missile field artillery and is, therefore, less likely to attract strong enemy countermeasures.
- (5) It can be employed effectively in either a nuclear (HE in adjustment) or nonnuclear role without detailed survey, when observed fire procedures are used.
- (6) It has a relatively simple ammunition problem in comparison with missile field artillery.
- (7) It has a rapid rate of fire, can respond quickly to requests for fire, and can provide sustained fire.
- (8) It possesses considerable mobility.

c. Limitations. The following limitations apply to all types of cannon nuclear artillery:

- (1) It cannot deliver the higher yield nuclear weapons.
- (2) Its maximum range is less than that of most types of missile field artillery.
- (3) Nuclear cannon projectiles make less efficient use of fissionable material than other types of nuclear weapons.

d. Employment. Cannon-type nuclear artillery units are normally employed in general support of the force as a whole, but may be given the mission of reinforcing the fires of the artillery of a force, or may be attached to a task force for an independent action. Movement of cannon-type artillery units may be by battalion, battery, or individual piece, depending on the situation, enemy capabilities,

and number of nuclear artillery units with the force. Movements will normally be coordinated and controlled by a higher artillery headquarters which will usually specify time, method of movement, routes, and position areas. Generally, movements should be made during darkness, inclement weather, or other periods of reduced visibility. When essential and as an exception to the general rule, cannon-type nuclear artillery battalions, batteries, or individual pieces may be held in reserve until the attack of suitable targets can be achieved with maximum surprise. Positions should be selected to provide maximum security consistent with the accomplishment of mission. Consideration is given to the enemy's guerrilla, air, and atomic capabilities.

89. Field Artillery Missile Units

a. General. Field artillery missile units provide the commander with a fire support means for attacking targets at short, medium, and long range with a variety of warheads possessing great destructive force. An understanding of the capabilities and limitations of field artillery missile units will enable the commander to employ them more effectively.

b. Capabilities. The exact capabilities of field artillery missile units vary with the type of missile. As a family of weapons, missiles can deliver a higher yield nuclear weapon at longer ranges with more efficient use of fissionable material than is possible with cannon-type nuclear artillery.

c. Limitations. Field artillery missiles are generally less accurate, more easily identified and located, less mobile, and have a slower rate of fire than cannon. In addition, the transportation, storage, care, and issue of liquid propellants used by some missile units and the greater survey accuracy required in establishing direction control for medium- and long-range missile units present problems not found in other field artillery units.

d. Employment. The employment of field artillery missile units is similar to that of cannon-type nuclear artillery units so far as missions, movement, positions, and security are concerned. However, field artillery missile units or elements thereof may be held in reserve more frequently than cannon-type nuclear artillery. The selection of suitable positions for some types of missile units requires consideration of electronic interference with the guidance system, which may occur as a result of the operation of electronic equipment by other units. For further information concerning the employment of missile units, see appropriate field manuals of the 6-series (app. I).

90. Artillery Employment in Chemical and Biological Warfare

a. General. Various types of field artillery units have a capability of delivering chemical and/or biological agents to an enemy target. The proper delivery of these agents offers to the commander a means of target neutralization which alone or in conjunction with other weapons may be more efficient than other means. Deeply dug-in enemy positions present a lucrative target for chemical munitions. For details of chemical and biological warfare, see FM3-5.

b. Unit Capabilities for Chemical and Biological Warfare. The capabilities of various artillery weapons must be considered in the determination of the most suitable weapons. Cannon units can deliver a volume of chemical and biological agents accurately but at limited ranges. Missile units are capable of covering large areas with surprise concentrations but the rate of fire is comparatively low. The use of missile units to deliver chemical and biological agents must be considered in conjunction with other requirements.

Section VIII. ARMY AVIATION

91. Organization

Army aviation is utilized to expedite and improve ground combat capabilities and logistical procedures. For a detailed discussion of army aviation, see FM 20-100.

a. All aircraft organic to the division are assigned to the division aviation company. The artillery flight of the division aviation company provides aircraft for division artillery.

b. All aircraft organic to corps artillery are assigned to the corps artillery aviation company (par. 56*k*).

92. Capabilities

Army aviation is capable of performing many artillery tasks. Some of these are—

- a.* Aerial observation.
- b.* Aerial photography.
- c.* Route reconnaissance.
- d.* Wire laying and radio relay, and message delivery.
- e.* Evacuation of casualties.
- f.* Aerial inspection of camouflage.
- g.* Battlefield illumination.
- h.* Survey assistance.
- i.* Column control.

j. Air movement of artillery weapons, crews, and supplies.

k. Aerial adjustment of fire.

93. Employment

a. The artillery flight of the division aviation company operates in direct support of or attached to the division artillery. It normally functions under the operational control of the division artillery commander or a subordinate unit commander within the division artillery. Decentralization of operational control to subordinate artillery units may be necessary in order to insure close support and maximum utilization of aircraft. The method of control used parallels the requirement set forth by the fire support and maneuver plan. Other considerations include air traffic control and additional airstrips and aviation facilities. Every effort is made to have supporting aircraft operate from airstrips in close proximity to supported artillery units.

b. For employment of the corps artillery aviation company, see paragraph 56*k*.

94. Airfields

The type of airfield used will depend primarily on the tactical situation and the availability of suitable landing areas and other facilities. Landing areas must be free from obstacles and must provide sufficient length and hard surface for the operation of fixed wing aircraft.

CHAPTER 6

OFFENSIVE COMBAT

95. General

The purpose of offensive action is to destroy the effectiveness of the enemy's armed forces and his will to fight. The offensive is conducted as an attack in a war of movement, attack of an organized position, and the exploitation. In nuclear warfare, action is characterized by nuclear fires, swift maneuver from dispersed positions, violent assault, and rapid exploitation. The desired combat power for the attack can be obtained through varied combinations of units and fires. These combinations provide great flexibility in plans of attack and organization for combat into forces for the main attack(s), secondary attack(s) and reserves. Nuclear weapons in reserve provide considerable firepower which to some extent offsets the requirement for a large reserve of troops. Allocation of nuclear fires is an important factor in determining the distribution of force required.

96. Field Artillery Employment

Field artillery must be disposed and organized to protect the assembly and attack positions and the movement into them, execute the necessary fires prior to the attack, furnish continuous support throughout the action, and protect the attacking units during the periods of reorganization. The preponderance of artillery firepower and the priority of fires is normally given to the main attack.

97. Fundamentals of Positioning Field Artillery in the Offense

Field artillery position areas in offensive combat are located—

- a. To accomplish the mission.
- b. Well forward to exploit the range of weapons, facilitate communication and liaison, and support the attack as long as possible without displacement.
- c. In the zone of the supported unit.
- d. To avoid interference with other units.
- e. To maintain adequate dispersion between units consistent with the attainment of effective fire support, and thereby avoid unnecessary concentration of troops.
- f. To give priority of positions to units providing close support for elements in contact (par. 74).

98. Control

In an advance guard action and in a meeting engagement, control of artillery is of necessity usually decentralized. As the situation develops, control is normally centralized as soon as circumstances permit. Prior to a preparation, control is centralized and remains centralized as long as possible during the attack. As the attack develops or the exploitation begins, control may again be decentralized or partially decentralized.

99. Registration

a. Registration increases the accuracy of subsequent fires, permits placing unobserved fires close to friendly troops, and saves ammunition. Unrestricted registration discloses the artillery positions and thereby indicates the size and deployment of the force, indicates the commander's intentions, and invites neutralization. The disadvantages of registration can be minimized by using special registration positions, by keeping the number of registering batteries to the effective minimum, by registering as late as practicable before the attack, by registering units simultaneously, by using predicted fire techniques to limit the requirement for registration, and by the use of accurate survey.

b. The force commander makes the decision as to whether registration will be restricted or prohibited. It is rarely necessary to prohibit registration except when employing free rockets and guided missiles. When conditions exist which indicate a requirement for restriction of registration, the force commander will coordinate registration.

100. Actions Prior to Attack

Actions of the field artillery prior to the attack include—

a. Development of organization for combat (pars. 51–62) and preparation of fire plans (ch. 12).

b. Reconnaissance, selection, and occupation of firing positions.

c. Completion of the signal communication system.

d. Establishment of common topographical control, established by survey or by firing.

e. Systematic organization and coordination of observation.

f. Assembly of supplies and equipment in forward areas.

g. Establishment of required liaison (par. 36 and fig. 5).

h. Registration in accordance with the instructions or policy of the force commander.

101. Meeting Engagements

a. When the advance guard deploys, supporting artillery occupies position at once to cover the deployment. Usually artillery with the remainder of the column immediately occupies position to furnish support. Units that have occupied positions during the advance guard action may have to displace early in order to be in forward positions to support an attack by the time it is launched. The artillery moving to positions should be given priority on roads.

b. The early employment of the observation battalion reconnaissance, radar, sound, flash, and survey elements is desirable. The attachment of observation batteries to divisions initially will facilitate their early employment.

c. Prearranged artillery supporting fires are not limited to concentrations covering the initial advance from the line of departure but are limited only by the time available for planning and the extent and accuracy of target locations. Subsequent fires in support of the attack are called for by air and ground observers and liaison officers.

102. Exploitation and Encirclements

a. The artillery with an exploiting or encircling force is normally attached. Artillery attached to these forces should have great mobility and be capable of delivering fire quickly. For these reasons self-propelled artillery is desirable. Because of the difficulty of supplying ammunition and fuel to the artillery of the encircling force, it may be necessary to attach additional transportation.

b. Artillery with a direct pressure force is normally retained under the control of the force artillery commander initially. As the action progresses, artillery may be attached to units making the most progress. Longer-range artillery usually remains under centralized control. Its fire missions include interdiction of enemy routes of withdrawal.

103. Field Artillery Support for Attack of an Organized Position

The preponderance of artillery firepower must be capable of supporting the main attack. When the main and secondary attacks are sufficiently close together, the artillery positions should be selected so as to make the preponderance of the artillery firepower available to both attacks.

a. The attack of an organized position usually requires the delivery of a preparation. The situation encountered in each operation, however, will dictate whether a preparation is required.

b. Fires in support of the attack are prearranged as to location

and, where justified by combat intelligence, as to time. Fires must be planned to protect the attacking unit during periods of reorganization.

104. Field Artillery Support of the Exploitation

a. Artillery with an exploiting force is normally attached. Since armored and motorized units are especially suitable for the mission of exploitation, the attached artillery must be highly mobile and capable of delivering fire quickly. Self-propelled artillery is desirable.

b. Long-range artillery fire missions include interdiction of enemy routes of reinforcement or withdrawal.

CHAPTER 7

DEFENSIVE COMBAT AND RETROGRADE MOVEMENTS

Section I. DEFENSIVE COMBAT

105. General

Defensive operations on the nuclear battlefield are characterized by flexibility, dispersion, and the necessity for additional defensive areas to be located in depth. Tactics employed must be capable of absorbing the initial shock and containing the enemy attack.

a. Objectives of Defensive Combat (FM 100-5). The general objectives of defensive combat are to gain time pending the development of more favorable conditions for undertaking the offensive, or to economize forces on one front for the purpose of concentrating superior forces for a decisive action elsewhere.

- (1) Under the first of these objectives, a commander may assume the defensive pending the arrival of reinforcements, or he may be forced on the defensive by inferiority in firepower, numbers, disposition, training, or logistical support. He may assume the defensive and invite attack as part of a deliberate plan to win the battle by a counter-offensive.
- (2) Under the second objective, the defensive usually is expressed in the mission received from higher authority. This mission may be to hold a vital area pending completion of the maneuver of other forces, to protect a flank, or to contain an enemy force while an offensive is being conducted on another part of the front or in another theater.

b. Mission. The mission of a force in the defense may be to deny a vital area to the enemy, to contain an enemy force, to protect a flank, or to effect maximum attrition and disorganization of the enemy as a preliminary to offensive action. The mission normally dictates the type defense selected and the position or area to be defended. However, such considerations as composition of opposing forces, the terrain, composition of friendly forces, and security may favor a different type or area of defense. A defensive mission may be imposed by the situation, directed by higher headquarters, or adopted voluntarily. Defensive measures always will be taken, in

the absence of specific instructions, when an attack has reached its objective or is unable to continue the advance.

c. *Basic Types of Defense.* Basically there are two types of defense—the mobile defense and the position defense. The defined types lie at opposite ends of a scale with a wide range of variations between. The primary difference between the two types is in the concept of the commander as to the manner in which the forces are disposed and the size and intended use of the reserve.

- (1) *Position defense.* When conditions favor or permit the organization of the battle area into a system of defensive sectors that afford strong mutual support to one another, the defending forces are disposed in a relatively compact form to insure maximum strength of the defense. This form of defense may be called a position defense. In the position defense, the bulk of the defending force is disposed in selected tactical localities with principal reliance placed on the forces in such localities to maintain their positions and to control the terrain between them. The reserve is used to counterattack, to restore the forward edge of the battle area (FEBA), add depth, provide flank and rear area security, block enemy penetrations, and to replace garrisons of defended areas. Many variations of the position defense are possible, depending upon the mission, frontage assigned, terrain, and the size and composition of available forces, including fire support.
- (2) *Mobile defense.* When conditions are favorable (FM 100-5), the mobile defense may be employed. In the mobile defense, forward defensive areas are occupied by the minimum forces necessary to observe, canalize, block, or impede the enemy while the remainder of the force is employed as a mobile striking force.

d. *Artillery Employment.* Artillery must be prepared to support all phases of defensive action. It must be capable of being employed in mass on critical localities, on ground that is lightly held, or beyond the range of the fires of other supporting weapons; it must be prepared to fire in any area by rapidly shifting its direction of fire or by occupying alternate or supplementary positions. Properly employed artillery firepower may be the deciding factor in the conduct of a successful defense of an area.

106. Security Forces

Security forces have the mission of providing early warning of the approach of hostile forces, gaining time for the main forces

to prepare for combat, forcing early deployment of the enemy, deceiving the enemy as to exact location of the battle area and observing the enemy's advance. Friendly aviation, covering forces (par. 73), the general outpost or reconnaissance and security forces, and the combat outpost comprise the usual security echelon to the front. In the mobile defense, the mission normally assigned to the general outpost or reconnaissance and security force may be executed by the covering force. When an infantry division is required to establish a general outpost in the mobile defense, its capability in accomplishing all aspects of the mobile defense is limited. Artillery is employed in support of ground security forces.

a. *General Outpost.* The general outpost is normally manned by elements of divisions or comparable units assigned sectors in the battle area. It is supported by artillery fires from within the battle area or from in front of the battle area. These artillery fires may include nuclear fires. Artillery operating in support of the general output should represent all calibers of artillery with the main force in order to deceive the enemy as to the location of the battle area. Artillery supporting the general outpost should be attached if the distance from the battle area is too great for centralized control. Artillery supporting the general outpost from within the battle area should utilize temporary positions to maintain secrecy of the battle area. On withdrawal of the general outpost, attached artillery is released from attachment and occupies previously selected positions in support of the main force.

b. *Reconnaissance and Security Forces.* Within their capability, reconnaissance and security forces perform missions prescribed for the general outpost and combat outpost. Reconnaissance and security forces are used in all types of defense when the area of security responsibility is large. Under nuclear warfare conditions, the division may use reconnaissance and security forces more often than a general outpost because of the more extended and multidirectional nature of the defense. Reconnaissance and security forces consist of a series of lateral outposts, road blocks, observation posts, and reconnaissance detachments. These forces are provided by the frontline battle groups or other divisional units. They are supported by artillery fires from within the battle area, or from in front of the battle area. These artillery fires may include nuclear fires.

c. *Combat Outpost.* Suitable terrain forward of the battle area is occupied by combat outposts which are usually furnished by echelons, lower than division, holding a sector of the forward edge of the battle area. The combat outpost is normally supported by artillery supporting the forward edge of the battle area. Artillery observers will normally accompany the combat outpost.

107. Field Artillery Support of the Battle Area

a. General. Since the rapid concentration of artillery fire is essential to a successful defense, centralized control of the artillery is required. Every effort is made to meet the main attack with a mass of artillery fire. Deceptive measures are employed to mislead the enemy as to the amount and location of artillery. Position areas are selected to provide continuous and effective artillery fire support throughout the action. Organization of position, observation, survey, communication, and fire planning are as complete as time and the situation permit. Artillery movements are coordinated with each other and with the movement of other forces to insure the most effective support.

b. Position Areas. The following are fundamentals in the positioning of field artillery in the defense:

(1) *Location.*

- (a) Artillery is located where it can accomplish the mission.
- (b) Artillery, including artillery observation, is echeloned in depth in order that continuous supporting fire may be provided in the event an enemy penetration neutralizes the position areas and observation of the forward artillery units.
- (c) All division artillery cannon should be able to fire immediately in front of the forward edge of the battle area.
- (d) The bulk of division artillery should be able to fire within the battle area.
- (e) Some artillery units are placed in forward positions to accomplish counterbattery and long-range harassing and interdiction fire.
- (f) Artillery units with a nuclear capability are positioned laterally and in depth to provide the most effective continuous support.
- (g) In selecting positions, advantage is taken of natural defensive features of the terrain and of incidental protection afforded by reserve units. Access to routes of withdrawal is considered.
- (h) Dispersion of artillery positions consistent with the attainment of effective fire support is sought as a means of avoiding unnecessary concentration of troops, and of limiting the neutralization of friendly artillery by hostile air attack and counterbattery fire, particularly when the enemy has the capability of employing nuclear weapons.

- (i) Priority of positions is given to units providing close support for elements in contact (par. 74).
 - (j) Every effort is made to position field artillery in the zone or area of responsibility of the supported unit or force, and to avoid interference with other units.
 - (k) Battle group artillery must be able to provide close fire support for its parent unit on commitment.
- (2) *Occupation of position.* Every effort is made to maintain secrecy in the occupation of position. Position areas are organized as completely as circumstances will permit. Camouflage is emphasized. All units prepare their positions for defense against ground attack, airborne attack, guerilla action, and infiltration (FM 100-5).
- (3) *Alternate and supplementary positions.*
- (a) If artillery units receive severe counterbattery fire or their positions become otherwise untenable, artillery commanders may move their units to alternate positions. An alternate position is so located that the unit can continue to accomplish the original mission.
 - (b) Force commanders may designate successive defensive positions in depth. Artillery supplementary positions are selected from which fire can be delivered in support of these defensive positions. A supplementary position is a position for firing on targets that cannot be attacked from primary or alternate positions. If artillery missions assigned in support of planned counterattacks cannot be carried out from primary or alternate positions, supplementary positions must be selected from which such missions can be accomplished.
 - (c) It is the responsibility of all artillery commanders that alternate and supplementary positions are selected and prepared to the extent that circumstances permit.

c. Observation. Field artillery observation should cover the entire defensive sector and should extend as far forward of the main battle area as possible. All artillery echelons coordinate their ground observation to insure effective coverage. Particular attention is given to ground observation covering areas lightly held or gaps which are to be controlled by fire. Maximum use is made of the facilities of all artillery and other observation agencies (b(1)(b) above).

d. Communication. The efficient operation of the artillery communication net is of special importance in order that the flexibility of artillery fire may be exploited. Due to the dispersion of forces

on the nuclear battlefield, a great amount of reliance must be placed on radio communication. However, when time permits, complete wire lines are installed, lateral lines are laid to provide alternate means of wire communication, and wire is installed in alternate and successive positions. Detailed plans for radio communication include the use of alternate channels.

e. Survey. Survey of all installations is as complete as the situation permits. Alternate and supplementary positions must be surveyed, to the extent that artillery can displace to these positions and commence firing immediately with effective massed fire.

f. Fire Planning. Detailed fire planning (ch. 12) is essential for effective artillery support of defensive operations. In general, fire plans in the defense are based on fires that—

- (1) Delay and disorganize the enemy's approach to the position.
- (2) Disrupt the enemy's preparation for attack by counter-preparation fire.
- (3) Impede the enemy's attack with close defensive fires in width and depth throughout the sector.
- (4) Break up the enemy's assault on the FEBA by final protective concentrations and barrages.
- (5) Limit penetration of the FEBA by fires within friendly lines delivered on call.
- (6) Destroy enemy forces that have been canalized into killing grounds within the battle area.
- (7) Support the counterattack and limited offensive actions associated with the counterattack.

g. Nuclear Fire Planning. A thorough study is made of the entire defensive sector to insure that all potential and known targets suitable for nuclear fires are included in the nuclear fire plan. The majority of the targets are planned for the attack on call of defending units. Nuclear fire planning in the defense is based on fires as indicated in *f* above. Nuclear and nonnuclear fires must be closely integrated to achieve maximum benefit of their capabilities.

Section II. RETROGRADE MOVEMENTS

108. General

a. A retrograde movement is any movement of a command to the rear or away from the enemy. Retrograde movements are further classified as a withdrawal from action, a delaying action, or a retirement. These retrograde movements may be forced by enemy

action or may be voluntary. Retrograde movements are usually covered by a mobile security force which devotes particular attention to flank security to avoid envelopment of the main forces (FM 100-5).

b. In retrograde movements the mission of the artillery is to neutralize the enemy artillery, to delay the enemy advance, and to assist the infantry or armor in disengaging from action. In the event the force commander launches a limited counterattack to assist the disengagement of units, the artillery must be prepared to support the counterattack with the preponderance of available firepower. The air defense of elements moving to the rear and of critical points along the route is of primary consideration. It is essential that the leading elements are not stopped and withdrawal routes are not blocked.

109. Withdrawal From Action

a. A withdrawal from action is the operation by which all or a part of a deployed force disengages from the enemy. The general purpose of the withdrawal from action is to regain or preserve freedom of action. It may be followed by a retirement, delaying action, or defense of another position. Contact with the enemy is maintained by reconnaissance or security forces. To avoid enemy detection, withdrawals from action are accomplished at night or during periods of poor visibility when possible.

b. For the employment of artillery with the security forces covering a withdrawal, see paragraph 73. The preponderance of the artillery firepower is withdrawn with the supported force. Most of the longer range artillery is moved rearward early. The appearance of normal artillery fire is kept up by artillery with the security force and by retaining units or portions of units composed of mixed calibers and types in position to be withdrawn with the last elements. In the last phases of the withdrawal, artillery support will be furnished by the artillery supporting the covering, general outpost, or reconnaissance and security force in front of the next defensive position. Artillery units engaged in the withdrawal are well stocked with ammunition. Deceptive measures are employed during the withdrawal.

110. Delaying Action

a. Delaying action is an operation in which space is traded for time. It is usually employed by covering forces and other security detachments and is executed most effectively by highly mobile units.

b. The use of self-propelled artillery in the delaying action is particularly effective. The employment of artillery in a delaying

action is similar to that with a rear guard (par 73). Artillery is usually attached to the delaying forces.

111. Retirement

a. A retirement may be made to extend the distance from the enemy, to reduce the support distance from other friendly forces, to secure more favorable terrain, to conform to the disposition of larger forces, or for employment in another area. When a withdrawal from action precedes a retirement, the actual retirement begins when organization of the march formations are completed.

b. Strong artillery support is provided the security forces. Sufficient artillery strength will force early deployment of enemy forces and permit the retention of flexibility by the security force. The remainder of the artillery is dispersed in the column or columns to support the main body or to furnish additional support for the security force.

CHAPTER 8

FIELD ARTILLERY IN SPECIAL OPERATIONS

Section I. GENERAL

112. Introduction

Special operations are those in which the terrain, weather, nature of the operation, or a combination of these create the need for special techniques, tactics, training, or equipment. Although treated as special operations in this manual, *such operations are considered normal by troops operating in situations where the above conditions prevail*. In special operations the basic mission of artillery remains unchanged, but the basic tactics and techniques may be modified. Examples of special operations are: amphibious, mountain, jungle, desert, deep snow, and extreme cold.

113. Plans and Estimates

The artillery commander at each echelon of command is responsible that a continuous estimate of the situation is made and that plans are prepared to provide adequate fire support and air defense for the maneuvering forces. Artillery commanders should seek to insure that personnel on their own staffs are trained in the detailed planning of logistical support for special operations when such operations are contemplated.

a. Information and intelligence on which to base estimates will often be acquired from agencies outside the control of the artillery. In certain special operations it will be impossible to verify much of the information received because of the remoteness or inaccessibility of the area in which the operation is to be conducted. Plans developed from estimates that are based on this type of information must be extremely flexible for adjustment to unforeseeable situations in the combat area.

b. Artillery plans for special operations will include considerations of—

- (1) Liaison and coordination with the appropriate arms and services of all forces concerned. Close liaison and coordination must be maintained continuously throughout the planning of, preparation for, and execution of the operation.
- (2) Acquisition, evaluation, and analysis of targets.

- (3) Coordination of fire support for the attack of targets by Army, Navy, and Air Force.
- (4) Amount and types of artillery and ammunition required during various stages of the operations.
- (5) Initial organization for combat and anticipated changes during the course of the operation.
- (6) Special equipment, clothing, and training required for units engaging in the operation.
- (7) Details of employment of artillery units, to include movement into selected positions areas, registration and fire plans, and survey requirements.
- (8) Special communication equipment and procedures required for the operation.

114. Training

a. Suitable training areas are normally provided for developing individual and unit techniques required in special operations. The training time necessary to attain adequate proficiency will vary from a few days to several months, depending on the initial state of training of the units and the type of operation being planned.

b. Artillery training for special operations includes—

- (1) The use of special equipment.
- (2) Operation, care, and maintenance of equipment under conditions of terrain and weather to be encountered.
- (3) Special techniques required in applying the basic artillery combat principles.

115. Liaison

a. Liaison assumes major importance in special operations. Normal command and staff liaison is effected. Liaison officers are employed between major elements involved in the operation. Normal liaison between echelons within each element is expanded. Liaison must be established early and maintained continuously to insure smooth and efficient progress from one phase of planning and preparation to the next. Exchange of information and coordination of plans are necessary to assure the commander that artillery is used to the maximum advantage and that, in the case of joint operations, provision is made for smooth transition of responsibility for fire support coordination from one force to another.

b. Liaison requirements during the preparation for and conduct of special operations of a joint nature may necessitate assigning this function as an additional duty to staff members and lower echelon commanders. This procedure, although placing a greater

burden on designated staff members and commanders, is desirable because those involved in interservice liaison and coordination are also directly involved in planning for their respective units.

116. Control

The type of operation and plan of maneuver will determine whether control is centralized or decentralized initially. When communication exists through which the division, corps, or force commander can quickly control and mass the preponderance of the artillery firepower, control is centralized. When such communication does not exist, control is decentralized. If decentralized initially, centralized control of artillery should be regained as quickly as practicable in order that the force commander may employ mass fires.

117. Meteorological Conditions

Extremes in weather necessitates greater corrections to the firing data. Rapid changes in weather conditions will make meteorological (met) data valid for only short periods of time. Under such conditions, there is a need for more frequent registrations and new meteorological data.

Section II. AMPHIBIOUS OPERATIONS

118. General

a. The complex nature of amphibious operations makes detailed planning of paramount importance. An outstanding difference between amphibious operations and other operations is the ship-to-shore movement. Centralized control is lost from the time of embarkation aboard ship until reorganization ashore. During this interval, which may extend for several weeks, the actions of artillery units embarked separately may often be governed exclusively by written orders.

b. Because shipping availability frequently disrupts the unity of artillery organizations, it is necessary that combat orders be written in much more detail than orders for other types of operations. Considerations for planning that are unique in amphibious operations are discussed in paragraphs 119 through 123. For further details on amphibious operations, see FM 6-101, FM 100-5, and 60-series field manuals.

119. Initiation of Planning

a. The landing force commander begins planning on receipt of the initial directive for the operation. The artillery commander with the landing force insures that liaison is established immedi-

ately between all artillery echelons. As the broad plans for the operation are formulated, the artillery commander of the landing force issues artillery training directives to lower echelons to ready them for combat along the lines of the proposed plan. On approval of the fire support plan by the landing force commander, the necessary instructions are prepared to put the plan into effect. The fire support plan furnishes complete tactical and technical instructions to the fire support means with the force.

b. In a corps operation, each division artillery commander and his staff initiate planning on receipt of the corps warning order. The details of the division fire support plan are completed as soon as possible after the corps fire support plan is received.

c. The division fire support plan will be detailed. Artillery unit plans will contain pertinent extracts from and references to the division fire support plan and to the unit standing operating procedure. Plans of battle group artillery and direct support artillery are based on the division fire support plan and plans of supported units.

120. Estimates

a. The landing force commander in preparing his estimate of the situation requires his artillery commander to make an estimate of the artillery requirements. The artillery commander's estimate of requirements must be a continuous process in order that recommendations and plans are kept abreast of the situation.

b. Normally, the initial operational directive indicates the means to be placed at the disposal of the landing force commander. Based on the number and size of the major units allocated and on the terrain, mission, and enemy situation, the landing force artillery commander makes an estimate of the artillery requirements to support the force. This estimate is made initially to determine the amount and type required of—

- (1) Cannon and missile artillery.
- (2) Ammunition.
- (3) Special equipment.
- (4) Shipping, landing craft, helicopters, and amphibian vehicles.

c. In arriving at the estimate of artillery requirements, the factors listed below are given special consideration:

- (1) *Mission of the landing force.* In an amphibious operation the mission directly affects the shipping and resupply requirements. The estimated duration of the operation will have its greatest effect on the amount of ammunition embarked. If the landing is to be followed by sustained land operations beyond the beachhead, shipping alloca-

tions must be adequate to support artillery ammunition resupply and replacement requirements. For a short operation, emphasis is placed on initial embarkation of ammunition, whereas a long campaign necessitates provision for resupply of virtually all equipment in addition to ammunition.

- (2) *Plan of maneuver of the landing force.* Artillery requirements will vary with the plan of maneuver of the landing force as well as with the relative location of landing beaches. The artillery support problem is much simpler if the assault force lands on adjacent beaches in a single sector. The plan of maneuver after seizure of the beach-head strongly influences the amount of artillery required.
- (3) *Terrain, weather, and hydrographic characteristics.* In addition to the information normally required concerning weather and terrain in the objective area, special information is needed pertaining to beach area. Gradients and widths of beaches, prevailing surf conditions, presence of submerged barriers, texture of sand, and existence of obstacles inland from the beach will affect the types and amounts of ships, landing craft, amphibian vehicles, aviation and special equipment required by artillery in getting on and across the beaches.
- (4) *Enemy capabilities.* Enemy capabilities, based on enemy strength, composition, disposition, status of supply, reinforcements, morale, and training, must be considered and evaluated in order to determine artillery requirements.
- (5) *Employment of other fire support means.* Estimates of artillery requirements should include consideration of landing force weapons capable of augmenting and supplementing artillery. These include tanks; air defense artillery; armored amphibians; naval gunfire; and tactical air support. The required ammunition supply rate for all these weapons must be considered concurrently with resupply difficulties in order to permit them to assume an effective artillery role for the specified period of the operation.

d. The armored amphibians are versatile landing force weapons and can be suitably adapted to a field artillery role, particularly in the initial stages of an amphibious operation. Initially, these vehicles have the mission of furnishing support to the assault infantry units and, at a designated time, may assume the field artillery role. When planning for the employment of these weapons as field artillery, the following should be considered:

- (1) Reorganization is necessary for proper employment as field artillery. The existing infantry-artillery liaison system is used and the observers of the artillery units furnishing close support fires to the infantry act as observers for the armored amphibians units. An additional consideration is the requirement for communication equipment to accomplish their field artillery role.
- (2) In making an estimate of the number of amphibious weapons needed, possible losses among the vehicles carrying out their primary assault role must be considered. A study of the beach defenses together with experience data concerning losses should be used as the basis for estimating the number of armored amphibians required for utilization in a field artillery mission.

e. Naval gunfire is suited to assume some of corps artillery's missions of reinforcing the fires of division artillery and execution of general support missions. When planning to employ naval gunfire, its shortcomings must be kept in mind. It cannot be readily massed and its ability to deliver precision or close supporting fires may be seriously handicapped during periods of reduced visibility. If the operation progresses inland beyond the range of naval guns, the estimate must provide for the landing of artillery of the proper type to replace its fires.

f. The estimate of artillery requirements should be written, because of its operational importance and the desirability of keeping a permanent record of the estimate for assistance in future planning. In determining the artillery requirements, the factors discussed above are considered in turn.

121. The Field Artillery Plan

a. *Organization for Combat.* The principles of organization for combat that apply to land operations are applicable in amphibious operations. Where combat elements of the division are to land at the widely dispersed beaches, it may be necessary to attach some division artillery to assault elements. Other divisional artillery units should be given a mission of general support or reinforcing. Centralized control of division artillery is accomplished as soon as practicable after landing, to provide flexibility of fire support. Corps artillery battalions should be either attached to division initially or assigned the mission of reinforcing division artillery. Amphibian vehicles to be used by the artillery for ship-to-shore movement should be attached to the artillery for embarkation and for the period necessary to land the artillery and its ammunition. Armored amphibians may be assigned primary and secondary

missions as outlined in FM 17-34. When these units are attached or placed under the operational control of division artillery, they will normally be employed in company-sized units.

b. Organization for Embarkation.

- (1) Division artillery should normally be organized for embarkation as a separate embarkation unit. Battle group artillery will normally embark with the battle groups. The following personnel are usually embarked as indicated:
 - (a) Corps artillery and division artillery commanders with their fire support coordination personnel are normally embarked with their respective commanding generals.
 - (b) Aerial observers and pilots are normally embarked in the ships transporting the artillery observation aircraft.
 - (c) Forward observer and liaison parties are embarked with their appropriate supported units.
 - (d) The remainder of the artillery should be embarked in such a manner as to maintain the tactical unity of the organizations.
- (2) It has been found that the landing ship, tank (LST), is, in most instances, the best ship for transporting artillery. If it is impractical to beach LST's in the target area, medium and heavy artillery should be loaded in landing craft, utility (LCU), or landing craft, mechanized MK VIII (LCM(8)) and transported to the objective in landing ships, dock (LSD). A less desirable means of transport is the attack (APA) or the attack cargo ships (AKA).

c. Zones of Fire. Principles for establishing zones of fire in land operations are applicable to amphibious operations. However, a beachhead operation may be likened to a salient, in that the artillery may have a field of fire greater than 3200 mils. It is very difficult in such a situation to mass the preponderance of the division artillery firepower, and it may be several days before all artillery units participating in a landing can prepare the necessary positions to cover zones other than their normal zones of fire. With proper planning and by assigning contingent zones of fire, it will usually be possible to provide some massing of artillery fires. Assignment of normal and contingent zones of fires should provide for massed fires on suspected areas of enemy concentration. Zones are normally assigned laterally; however, zones in depth may be assigned. In determining the zones of fire, the artillery commander must consider the necessity for covering dead spaces in the zones of action

of assault units. Units to the flank may be able to provide fire into spaces defiladed from other units. In such cases, crossfire must be employed for maximum fire support. Minimum range considerations may also dictate the use of crossfire in order to provide fire support early in the operation, while the assault units are expanding the beachhead. If crossfire is impractical, contingent zones of fire may be assigned to assure coverage of defiladed areas.

d. Position Areas. The landing force artillery commander must coordinate the assignment of position areas for the artillery units with the force. Each lower echelon artillery commander must further subdivide the assigned area for the units of his command. A map and photo-reconnaissance will be made, considering—

- (1) The ability of the artillery to cover the designated zones of fire.
- (2) The coordination of position areas with the location of supply points, engineer construction, and routes of communication.
- (3) In the limited space of the beachhead, few good position areas will be available and many desirable features such as defilade, concealment, dispersion, and good supply roads must be partially or completely sacrificed.
- (4) Areas should be selected to provide the maximum possible security for the comparatively immobile artillery. Medium and heavier artillery must be located so that a temporary change in lines will not expose it to enemy small arms fire.
- (5) Positions should be chosen so as to be accessible from the proposed landing points.

e. Target Information. Artillery intelligence exploits every available source and agency to locate targets during the planning phase. Aerial photographs, taken at frequent intervals, must be made and studied by all echelons. Schedules of targets and priority for attack are made by the fire support coordination agency. These schedules are kept current by study of the latest aerial photographs and post strike analysis reports of air strike and preliminary bombardment by the advance force. At every opportunity, corrections are furnished to those headquarters previously issued the schedules of targets.

f. Survey. Artillery intelligence exploits every possible source and agency to determine the amount of survey control existing on or near the beachhead. Each echelon of survey makes detailed survey plans based on complete map and photographic reconnaissance. Survey sections are landed as early as possible in order to insure maximum capability for massing fires.

g. Communication.

- (1) *Radio.* The control and coordination of artillery units of the landing force during the ship-to-shore movement makes it imperative that a communication plan meeting the requirements of simplicity, reliability, and flexibility be placed in effect. The artillery communication plan provides for communication between the force artillery commander, all subordinate elements, and the tactical logistics group, whether they are afloat or ashore. It must provide communication between the artillery commander and subordinate elements; to battle group artillery or direct support artillery; and to forward observers and liaison officers with the infantry, whether afloat or ashore. Radio channels assigned must be utilized to establish communication on the simplest and most flexible net possible. A detailed radio plan to include all frequencies of artillery units is usually included as a tab to the artillery appendix to the fire support plan annex. During the planning phase, communication equipment that will be needed by other supporting weapons to communicate with the artillery, must be determined and requested from the supply source and these units are included in the artillery communication plan.
- (2) *Wire.* Complete wire communication is established at the earliest practicable moment. Wire communication plans are detailed and include the proposed line route maps of all lower echelons. Decentralization of wire laying is planned. Wire teams are briefed with maps and aerial photographs on routes for laying of wire nets.

h. Ammunition Supply. The artillery commander of each echelon must have a detailed ammunition plan. These plans should provide for the rapid unloading of ammunition and its delivery to cannon and missile artillery units in firing positions ashore without confusion as to type, size, type of fuzes, warheads, propellants, or powder lot number. In addition, each plan provides for delivery of ammunition to firing units or supply points ashore with minimum rehandling en route. It must be determined whether palletizing all or a portion of the artillery ammunition will accelerate or delay its unloading. Consideration should be given to the amount of organic transportation that will be landed and its availability for handling ammunition ashore. Coordination of ammunition unloading with shore party and control groups personnel is necessary to insure that ammunition-carrying amphibious vehicles are not detained or diverted to other use during the unloading phase. Consideration should be given to

aerial delivery of ammunition supply directly to artillery positions by helicopter to reduce beach congestion.

i. Time of Landing. The time of landing of the division and corps artillery depends on such variables as availability of position areas, need for artillery ashore, conditions of beach entrances and exits, and the ability of the shore party to effect the landing. Battle group artillery lands with the battle groups. Artillery plans usually state that division and corps artillery units will land on order of the division and corps commanders respectively. This requires the corps artillery and division artillery commanders to make a continuous study of the situation ashore and recommend the landing of elements of their respective commands at the most propitious time. Their study is based on all available information that is received on the command ships and particularly on the reports of forward observers and liaison officers ashore. The reconnaissance parties recommend to the division artillery or corps artillery commander the proper times for debarkation and landing of the remaining artillery elements.

j. Reconnaissance. During planning, a continuous reconnaissance is made by utilizing all available maps and photographs, of the objective area. If practicable, an air or seaborne reconnaissance by artillery officers is made within the beach area, and immediate terrain inland to select the best landing beaches, position areas, routes, and observation facilities. The plan for the ground reconnaissance includes the size of the party and its composition. Appreciably larger parties than are used in normal land warfare must be employed to facilitate the selection and preparation of position area for the immediate entry into action of the units on landing. Sufficient guides and communication, survey, fire direction, local security, and pioneer personnel are included to insure thorough reconnaissance and rapid preparation and occupation of positions. During planning, arrangements should be made with the shore party for that unit to reconnoiter for artillery landing points and artillery LST beaching areas.

k. Ship-to-Shore Movement. Planning the ship-to-shore movement resolves itself into determining the best procedure for landing the artillery elements. The best procedure will be determined after consideration of the factors listed above. This will mean provision of boats or amphibious vehicles, depending on hydrographic conditions, in sufficient quantity at the proper place and time. The debarkation schedule and the boat assignment tables will be set forth in this plan.

l. Field Artillery Support of the Beach Assault. Artillery to sup-

port the beach assault is employed when possible. Considerable advantage accrues to the infantry, when the artillery is set up to give normal and continuous fire support throughout the beach assault. Artillery can bring concentrations in close to the infantry, place accurate destruction fire on targets susceptible to destruction, and fire with accuracy at night and during periods of low visibility. Such support is possible in atoll warfare, waterborne envelopments, and where the geographical and tactical situation is favorable on large islands or land masses. The artillery units may be emplaced on islands adjacent to the assault beaches or on a peninsula or promontory from which fire can be placed on the proposed landing beaches. The plan must provide detailed plans for supporting fires. The primary concern is that the main landing area be within effective range so that the artillery can support the landing area, and the continuation of the attack ashore.

122. Rehearsal

Because of the many details involved, it is essential that the plans for an amphibious operation be tested by rehearsal to insure that all units are familiar with the embarkation and debarkation procedures and techniques. The rehearsal should simulate as closely as possible the conditions to be expected in the objective area, to include firing of live ammunition by the units participating.

123. Movement to the Beach

In an amphibious operation, certain elements of an artillery unit must land prior to their artillery weapons. These elements include forward observers, liaison personnel, reconnaissance parties, and, if possible, survey sections. A sequence of landing is essential to an orderly and well-controlled landing, so that observers will be in position, liaison will be functioning, reconnaissance and survey will be complete to the extent possible, prior to the time the firing batteries arrive on the beach.

a. The sequence of landing for a ship-to-shore movement complete with all elements is given below.

- (1) Forward observer parties are landed with each infantry rifle company.
- (2) An artillery liaison party lands with each battle group command post. Forward observers and liaison officers keep their artillery headquarters informed as to suitable landing beaches, exits from the beach, the condition of position areas, and the progress of elements ashore. Where division artillery units are attached to the battle groups, provisions

must be made for keeping these units informed of the situation, and for providing position areas ashore.

- (3) The artillery reconnaissance parties are landed as early as the situation permits, to reconnoiter the tentative position areas and select final positions for the necessary installations. Being mindful of the time and space factors involved and the situation ashore, the reconnaissance party commander will recommend to the appropriate headquarters the time to debark the remainder of the unit. Artillery survey sections are landed as early as the situation permits so that maximum survey of the position area can be accomplished prior to arrival of the firing batteries.
- (4) After the reconnaissance has been completed and when the beach areas are reasonably free from enemy fire, the artillery unit is landed on request of the reconnaissance commander. On debarkation, the unit assembles in a rendezvous area afloat and then proceeds to its landing beach and thence to its position area. The remainder of the unloading activities are a ferrying operation of ammunition, other supplies, and remaining personnel and equipment from the ships to the artillery position areas.
- (5) Reconnaissance parties of division artillery and corps artillery headquarters batteries are landed at about the same time as those of their subordinate battalions. The remainder of these batteries are landed on the request of the reconnaissance party commander. The division artillery executive officer is normally placed in charge of division artillery operations ashore, until the division artillery commander lands. The assistant corps artillery officer or corps artillery executive officer is normally placed in charge of corps artillery operations ashore, until the corps artillery commander lands.
- (6) The corps artillery and division artillery commanders and fire support coordination center personnel move ashore with the corps and division commanders as the command post of the echelon is landed. Corps and division fire support coordination center personnel usually displace ashore in two echelons, the second echelons, the second displaces after the first is in operation ashore. Responsibility for coordination of fire support passes from the naval attack force to the landing force when the landing force commander opens his command post ashore.

b. When the artillery is to be landed from beached LST's the

number of elements required to execute the ship-to-shore movement will be reduced. LST's are moved to the inner LST area to launch the reconnaissance parties. On request of the reconnaissance party commander that the remainder of the unit be ordered ashore, if the tactical situation on the beach permits, the beach is sufficiently clear of enemy fire, and hydrographic conditions permit, the LST's will be beached. LST's carrying medium and heavy artillery must be beached for the debarkation of those units. Those LST's carrying ammunition will also be beached to facilitate unloading.

Section III. AIRBORNE OPERATIONS

124. General

a. Airborne operations consist of the movement into an objective area of combat forces with their logistical support forces for the execution of tactical as well as strategic missions. These forces may consist of airborne divisions, infantry divisions, air transportable army missile commands and other air transportable units. Airborne operations may be joint, using Air Force and/or U.S. Navy aircraft, or unilateral using Army transport aircraft.

b. Light and medium artillery normally accompanies the assault echelon of an airborne assault or the initial echelon of an air-landed operation (FM 57-30). The division artillery of the airborne division is trained and capable of entering combat entirely by parachute assault with the exception of the materiel of the airborne division missile battery which is air transportable in heavy transport aircraft. The airborne division light artillery and the infantry division light and medium artillery is air transportable in medium transport aircraft (FM 57-30) (FM 57-100) and medium assault aircraft. Light and medium nondivisional field artillery has the same air transportability as infantry divisional units equipped with similar materiel. Heavy cannon artillery and short range missile artillery is air transportable in heavy transport aircraft (FM 57-30). Very heavy cannon artillery and medium and long range missile artillery is not air transportable without extensive disassembly. Light and aeropack artillery are helicopter transportable as slung loads (disassembly may or may not be required) on light transport helicopters and as internal loads in medium transport helicopters. Artillery may support airborne operations from outside the objective area by providing long-range nuclear or nonnuclear fires.

c. Special factors affecting artillery employment in an airborne operation are—

- (1) Mass preassault nuclear and/or nonnuclear bombardment of enemy forces and installations in the objective area.

- (2) Other preassault nuclear and/or nonnuclear fires.
- (3) Air defense of the mounting area.
- (4) Capability of artillery to rig material for heavy drop parachute delivery; transport in aircraft or by helicopter.
- (5) Refresher training in air transportation techniques.
- (6) Application of rigid security to deny the enemy knowledge of the planned operation and to preclude his use of nuclear fires against the departure area prior to the operation being launched.
- (7) The possibility of creating obstacles or excessive contamination in the objective area when nuclear fires are to be employed in the area prior to landing.
- (8) The impracticability of conducting ground reconnaissance of position areas in the assault objective area, and determination of accurate declination constants, survey datum and target intelligence from outside agencies.
- (9) Essential communication between the airhead artillery headquarters and the artillery headquarters of linkup or supporting forces.
- (10) Early establishment of centralized control of artillery attached to battle groups for the assault phase.
- (11) The need for a fire coordination line between airborne assault and linkup forces to prevent fires or the effects of fires of one force from interfering with the operation of the other force.

125. Plans. and Estimates

Preliminary plans and estimates for airborne operations normally originate at theater level (FM 57-30) with the tentative selection of missions for the airborne units. Joint airborne force develops or assigns to subordinate airborne task forces for development, detailed operational plans for specific units. With announcement of the complete planning directive, concurrent and continued planning is undertaken at all echelons of the affected units. Techniques and procedures for airborne planning are contained in FM 57-30. It should be emphasized that commanders and staffs at each level of command are included in the planning sessions of the next higher headquarters. Similarly, it is desirable that artillery representatives be included as members of the supported unit's planning groups. This practice expedites concurrent planning at all echelons through personal coordination between successive headquarters. During the early phases, plans must be developed from estimates that may be based on assumptions and fragmentary information. All plans, how-

ever, are subject to change as more complete and reliable information becomes available to the subordinate units.

126. Training

a. An analysis of the airborne force mission and the elements of intelligence concerning the drop area and objective will indicate the type of training that must be stressed. Special attention will be devoted to training in loading aircraft (TM 57-210). The types of aircraft that are to be allocated to each unit should be determined as early as possible. In the event the units are unfamiliar with the types of aircraft included in the allocation, additional training in loading will be necessary to insure efficient operation. Training will include complete rehearsals and practice landing areas should be selected which resemble the terrain of the actual landing areas as closely as possible.

b. Although it is desirable to drop or air land the artillery in areas already secured by the infantry, changing situations may force artillery units to defend themselves in the drop or landing zone or to fight their way to designated assembly or position areas. These probabilities require that artillery units be trained in infantry tactics, to include fire and maneuver and use of individual weapons. In addition, the artillery must be trained for the following eventualities:

- (1) Decentralized control.
- (2) Movement of pieces by hand.
- (3) Communication by radio only.
- (4) Defense of own position.
- (5) Abnormally large sectors of fire.
- (6) Enemy employment of nuclear weapons against the air-head.

127. Intelligence

Information and intelligence concerning the landing area and objective will be obtained from higher headquarters and from agencies not under the control of the artillery (FM 57-30). The artillery's principal means of supplementing target information is through interpretation of aerial photographs. Therefore, it is mandatory that complete aerial photographic coverage of the area of operations be available to the artillery commander. In most cases, photographic interpretation will be the only means of reconnaissance, selection of positions and routes to assembly areas, and identification and evaluation of targets.

128. Communication

Radio is the principal means of ground and air-ground communi-

cation (FM 57-30). Visual signals and prearranged codes can supplement radio and will furnish quick and reliable communication, particularly between air and ground elements. Short wire lines, laid quickly by hand, will facilitate fire direction. Wire laying by light aircraft for longer distances may be used when feasible. The communication plan must provide for expansion from decentralized to centralized control and for communication with other supporting arms and services. The correct use of appropriate signal operations instructions (SOI) will reduce or eliminate much of the communication difficulties and confusion characteristic of early action in the area of operations.

129. Security

Surprise is a requisite for successful airborne operations. The amount of information that can be divulged to the troops and the time of its release are regulated at all echelons of command (FM 57-30). Usually, only a few key personnel are briefed prior to being sealed in the marshalling areas. However, every man is briefed concerning his role in the operation as soon as security permits.

Section IV. OPERATIONS IN DEEP SNOW AND EXTREME COLD

130. General

Artillery units operating under conditions of extreme cold are faced with two main problems; survival and mobility. The season of the year, equipment, and training affect the survival problem. Mobility is a greater problem during the warmer months than during the colder months. Shelter and heat are major requirements for troops operating in snow and extreme cold. Concentrations of troop shelters make profitable nuclear targets. Where the enemy employs nuclear weapons, casualties may be unusually high because of direct effects of the explosion, secondary fires, and subsequent exposure to extreme cold. Where the ground is frozen and no snow cover exists, personnel are particularly vulnerable to nuclear attack. For additional information on arctic operations, see FM 31-70, FM 31-71, and FM 100-5.

131. Plans and Preparation

The types of artillery employed in cold weather operations vary with the mission, terrain, and transportation available. Tables of organization and equipment often must be augmented to accomplish the assigned mission. Personnel and equipment must be made available well in advance of the operation so that training can be conducted under conditions similar to those anticipated in the opera-

tion. Troops must be trained in their primary duty prior to entering into deep snow and extreme cold conditions. Winterization of all items of equipment and installation of modification kits must be performed prior to arrival in extremely cold areas.

132. Survey

Survey in snow and extreme cold is slow and tedious. Lenses quickly become fogged. Computation of data must be done in heated shelter. Control points are difficult to locate and will normally be found only along well-established roads and railroads. Because of deep snow, crevices, and other obstacles natural to arctic terrain it is often simpler and faster to run a survey by following existing roads and trails even though the cross-country distance is considerably shorter.

133. Movement

The best time of the year for cross-country movement of heavy vehicles is during the latter part of the freezeup period and the first part of the winter period prior to the arrival of heavy snows. The use of over-snow vehicles increases the mobility of the supply and reconnaissance echelons of the artillery unit. Self-propelled artillery weapons are more maneuverable than towed weapons; however, the present self-propelled artillery is too heavy to allow it to traverse deep snow (over 36 inches) in winter or muskeg in summer. In the summer, movement on waterways such as lakes and rivers is often possible.

134. Positions

a. Supply difficulties greatly influence the selection of position areas. Positions are chosen for their tactical utility and for protection from the elements. Prior to occupation of a position, gun pits, traffic lanes, and snow parapets should be prepared. Alternate positions should be selected early and prepared as time permits. Positions should be continuously improved with primary emphasis on protection of personnel, equipment, and ammunition. Under winter conditions it is impossible to dig in a position, but parapets of snow and ice can be erected. In extreme cold, some type of shelter for gun crews and other personnel will have to be erected and arrangements made to relieve standby gun crews, guards, and outposts as often as every 15 minutes and allow them to return to heated shelters. If the situation is static, group shelters are erected for the men.

b. Camouflage discipline must be strictly enforced. Limited camouflage can be obtained by application of paint. Tracks left in

snow cannot be effectively covered except by a fresh snowfall, and even in the arctic there are many periods without snowfall. Therefore, vehicles and troops must move only by designated trails and roads to maintain camouflage.

135. Observation

a. During winter months, good observation is limited to a few hours per day because of the short periods of daylight. Snow cover reduces depth perception and obscures ground features and landmarks. Glare of the sun upon the snow is intense and unless personnel are wearing dark glasses, continued exposure will cause painful snow blindness. Amber filters for observing instruments are required to reduce eye strain. Personnel operating observing instruments must be relieved frequently or provided with shelter. Both rotary and fixed-wing aircraft are excellent observation posts. Forward observer teams should be well trained in the use of over-snow equipment and in rock climbing technique.

b. Standard countermortar radar is extremely sensitive to low temperatures. Heat must be applied to the console before it will operate when temperatures are low. Heated shelter is required for plotting personnel.

c. Sound recorders are not affected by low temperatures. Microphones will function satisfactorily at low temperatures and under 4 to 6 inches of dry snow. Time required to establish a sound base in arctic regions is normally 4 to 5 times that required under normal conditions. Heated shelter is required for computers and plotters when temperatures are below freezing or winds are high.

136. Field Artillery Fires

a. At times, especially during extremely cold periods and periods when temperature changes are sudden, ballistics of weapons and ammunition are affected. During extremely cold periods, a K factor of 100 meters or more per thousand is not uncommon. Fuze quick is ineffective in deep snow, as up to 90 percent of the fragmentation is absorbed by the snow cover. An air burst with either a variable time (VT) or mechanical time fuze is most effective against personnel in the open. Although VT fuzes are adversely affected by conditions of extreme cold and there is an increase in the number of malfunctions, it is one of the most effective fuzes for the arctic. For information concerning the effects of nuclear weapons in snow, see FM 101-31.

b. Deep snow has an adverse effect on chemical shells. The canister from a base ejection shell may be smothered in the snow. The phosphorus shell produces the desired smoke but leaves phosphorus

particles buried in the snow that may remain a possible hazard for several days.

c. During extreme cold, the rate of fire will be slow until weapons have warmed; this is especially true for weapons having a hydro-pneumatic type of recoil. Preparation of ammunition is slow when temperatures are low because of the reduced efficiency of personnel.

d. Under conditions of extreme cold, heating blankets or other means may be necessary to protect missile motors which use solid propellants.

137. Communications

a. Radio is a rapid and useful means of communication in low temperatures and areas covered with deep snow. However, dry and wet cell batteries are seriously affected by extreme cold, both in storage and operation. The efficiency and life of batteries decrease in direct ratio to the cold.

b. Wire lines are normally restricted to existing trails and roads and are vulnerable to all existing hazards. Poles are broken by storms or unrooted by frost heaves. Wire laying by light aircraft is economical and should be employed when practicable. It is usually less time consuming to lay new lines than to attempt repair of old ones. Difficulties will be encountered when laying cold soaked telephone wire as the insulation will break about every 4 inches; therefore, wire must be stored in a warm place up to the time of laying.

Section V. MOUNTAIN OPERATIONS

138. General

The standard artillery units of corps and divisions can operate successfully in mountains, although mountain warfare imposes special problems concerning mobility, fires, and tactical employment (FM 100-5). Personnel working in high altitudes perform their duties with marked loss of efficiency because the decrease of oxygen causes a need for more frequent rest periods. Commanders must consider this additional time factor when planning for mountain operations. This section summarizes those problems which require particular attention in mountain operations.

139. Mobility

The movement of artillery, in general, is restricted to roads and improved trails. This characteristic is emphasized in mountainous areas because the scarcity of adequate roads and trails greatly limits the choice of avenues of approach to the extent of canalizing the movement of artillery. In addition, the winding roads and steep

slopes, characteristic in mountains, cause difficulties in turning towed weapons and in getting them into and out of positions. Towed light artillery can sometimes be manhandled under these conditions. Aeropack artillery and artillery mortars can be moved on unimproved trails and thus can be used well forward and in positions inaccessible to other artillery. Helicopters can be used to transport towed light artillery and mortars into areas that have no road access. Self-propelled artillery, although able to negotiate sharp turns and capable of ascending and descending steep slopes is hampered by tracks slipping on icy roads. This disadvantage may be partially overcome by the use of grousers.

140. Fires

a. Artillery fire is not as flexible in the mountains as in the plains, because the choice of positions is restricted and masks are high. Since howitzers and mortars have arching trajectories, they are well adapted to mountain warfare. High-angle fire is employed frequently to reach over masks, behind crests, and into deep valleys. Adjustment of fires is difficult for targets located on peaks and reverse slopes. Guns, with their flat trajectories, cannot be used close to the front except in direct fire roles. Normally, guns are employed far enough to the rear to take advantage of an increased slope of fall. Some artillery may be moved forward to provide long-range interdiction fires.

b. The great majority of artillery fires in the mountains must be observed, especially close support and defensive fires. Observation parties must be enlarged to include porters for carrying equipment. Airplanes and helicopters increase the range of observation and permit searching of spaces into which ground observers cannot see.

c. Unobserved fires are generally unreliable in the mountains. Meteorological conditions change rapidly and registration corrections for high-angle fire are valid for only short periods. Effective transfer of fires is difficult, since altitudes within transfer limits vary so greatly. It is often necessary to fire a check round in the vicinity of a target before firing for effect on the target.

141. Ammunition

Impact high explosive is very effective in rocky ground, scattering stones which in themselves become missiles. Experience has shown, however, that protracted bombardment with impact explosives of defensive positions in the mountains does not produce many enemy casualties. Artillery fires may be used to initiate rock or snow slides which block supply routes or engulf enemy defenses. VT and time fuzes are effective, particularly against troops held in reserve on reverse slopes. Smoke is used but is difficult to control because of

winds. For information concerning nuclear weapons effects in mountains, see FM 101-31.

142. Targets and Target Location

a. Ideal artillery targets are passes and defiles which form bottlenecks on the enemy supply route. Interdiction of such targets is usual. Fire against targets on forward slopes and crests does not often produce decisive results. Since the defender is usually dispersed in small groups, mass fire of many artillery weapons is unusual and expensive.

b. Direct observation by ground or aerial observers is the most reliable means of locating targets in the mountains. Ground observers usually will be restricted in observation to the next hill mass. Deep defilade makes it difficult to locate enemy weapons. Army aviation should be used to search areas defiladed from ground observation. High-performance aircraft have difficulty in performing observation missions while avoiding mountain hazards. Much reliance must be placed on shell reports because of the inefficiency of radar and sound ranging in mountains. Radar surveillance is adversely affected by ground clutter, and sound ranging is very difficult because of echoes. Map and aerial photograph study often discloses probable gun locations since the enemy is also restricted in his choice of gun positions. Deep shadows and uneven illumination increase the difficulty of interpreting aerial photographs.

143. Control

Terrain compartmentation often requires the use of multiple columns in the attack. Small forces require artillery support and it may be necessary to decentralize control of artillery to provide support for all columns. Portions of general support artillery units may be detached in order to provide support for units that are separated by terrain features. However, this tends toward decentralization, and loss of control, and is not advisable unless absolutely necessary to provide fire support.

144. Communication

Main wire routes are restricted to roads and are susceptible to being interrupted by breaks caused by enemy artillery or friendly traffic. Wire laid cross-country is difficult to maintain and is often broken by rock and snow slides. The utilization of army aircraft to lay and maintain wire during mountain operations aids in solving this problem. Radio communication is used extensively. Antennas of very high frequency sets, either AM or FM, require careful selection of sites because of the line-of-sight characteristic of high frequency radio waves.

Section VI. JUNGLE OPERATIONS

145. General

Jungle combat is a special operation primarily because the inherent difficulties of terrain, climate, and visibility complicate the vital problems of command, movement, supporting fires, supply, and evacuation. Normal procedures must be modified, and specialized equipment must be employed. Training for jungle operations must include thorough indoctrination on life in the jungle, stressing limitations, advantages, personal hygiene, and care of equipment.

146. Mobility

Jungle conditions impose greater restriction on the movement of artillery than those encountered in any other type of operation. Suitable roads and improved trails are almost nonexistent away from settled areas. Roads must be constructed as the movement progresses and must be maintained continuously as jungle growth will quickly reclaim neglected or abandoned roadways. Special equipment is needed to insure the rapid and efficient construction of roads that will withstand tropical conditions. Equipment includes tractors capable of traversing boggy and swampy terrain; bulldozers for use in roadbuilding, and in preparing positions; and, in some cases, boats for crossing rivers and flooded swamps and for displacing along shorelines and rivers. The use of helicopters to move artillery and resupply ammunition will materially assist the mobility and flexibility of artillery in jungle operations.

147. Fire Capabilities and Limitations

a. As in mountain operations, the flexibility of artillery fire is reduced by excessive mask, scarcity of suitable position areas, lack of accurate maps, and restricted observation. High-angle fire will often be required to clear tall masks surrounding positions. Direct fire missions will frequently be required in defense of positions against ground attack. Caves and pillbox emplacements can be destroyed by field artillery missiles or by heavy and medium cannon artillery used in a direct fire role. Chemical agents may be used for casualty effect on these prepared positions and emplacements that are relatively invulnerable to other weapons. Light artillery can be used to defoliate trees and natural camouflage to expose hidden emplacements.

b. Adjustment of fire on close-in targets is often conducted by the observer listening for the whistle and burst of the shell and bringing the burst on the target by *creeping*. When this method of adjustment is used, firing data must be carefully checked at the fire direc-

tion center. Observers with adjacent units can assist in the adjustment by giving their sound sensings.

c. Under weather conditions normal to tropical areas, meteorological data are not subject to rapid change and meteorological corrections are reasonably accurate. However, maps are usually so poor that map data are not accurate and vertical control is often nonexistent. When artillery registrations are current, surprise fires by transfers are effective.

148. Observation

a. Observation is extremely restricted by jungle growth and is often limited to the immediate vicinity of the observer. Observer parties must be well forward, often accompanying patrols, so that they can use their limited observation to best advantage and be aware of the location of forward elements. Parties must be large in order to carry equipment, lay wire, and provide security. Check points and known locations are rare and observers must use initiative in devising methods of spotting fire. The observer must know the slope of fall of the projectile and the height of the trees in the vicinity of the target to avoid bursts over friendly troops. Often, close-in targets can be engaged only through use of high-angle fire. On rare occasions, some observation advantage is gained from high trees and dominating terrain. Aerial observation from Army aircraft is efficient for location of distant targets, such as enemy batteries, troop concentrations, bivouacs, and boat movements; however, it is usually necessary for these planes to fly over enemy territory to gain information of specific targets. Although observation from light planes may be limited, it is of great assistance to the artillery and should be employed when possible.

b. Army aircraft can be profitably utilized in jungle warfare in adjusting fires, locating friendly lines, spotting targets for air strikes, delivering supplies to forward units, and acting as relay or control in artillery radio nets. Observers in planes can work with ground observers to adjust artillery. Often the ground observer can hear but not see the rounds fall, although he can see the target, and the air observer can see the rounds but knows only the approximate location of the target. A combination of their sensings gives the fire direction center a better picture of the adjustment and speeds up the delivery of effective fire.

149. Survey

Survey is slow and difficult in the jungle. Control points are few and maps are poor. Since the advance of the infantry is slow, extension of survey can usually keep up with forward elements. Target

area survey is usually very restricted, limiting most survey operations to position area connected by traverse to observers. Traverse legs are necessarily short and vertical control is usually extremely limited. Machete crews assist the survey teams.

150. Target Location

Patrols are the most lucrative source of target locations. Sounds, flash, and radar may be used for locating targets, but they are restricted by tree canopy, slow survey, poor trails for moving heavy equipment, and necessity for clearing fields of operation for the radar sets.

151. Positions

There are few good gun positions in the jungle. Usually areas must be cleared with bulldozers and engineer power tools; this is especially difficult because arcs of fire must be large. In clearing fields of fire, care must be taken to disturb the tree pattern as little as possible to avoid disclosing the position to enemy air. In wet weather, roads into positions must be corduroyed and platforms must be built under the weapons. Weapons should be closer together than in open terrain in order to facilitate control and security.

152. Security

When the tactical situation permits, the battle group artillery should be located within the area of the infantry reserve to take advantage of the protection provided by the riflemen. The batteries of a battalion-size unit should be close enough to each other to provide mutual protection. Each battery must establish a perimeter defense, and the defense systems of the batteries must be integrated into a battalion defense plan (FM 6-101). Security must be stressed when displacing to new positions, since the jungle aids the enemy in preparing an ambush. The march security precautions discussed in FM 31-21 are applicable.

153. Ammunition

a. Supply and storage of ammunition is a critical problem in the jungle and requires constant effort and attention on the part of all concerned. Since many missions are fired close to friendly troops, sorting of ammunition must be carefully supervised to insure uniform lots. Ammunition must be stored with care to protect it from moisture, as exposed powder deteriorates rapidly in the humid jungle.

b. White phosphorus smoke is very often used during adjustment to facilitate observation and to mark targets for air strikes. Large-scale smoke screens are not as common as in open terrain. Proximity

fuzed shell and time fire are generally ineffective because heavy overhead growth reduces the fragmentation effect. Quick fuze produces tree bursts below the canopy and is especially effective in clearing out snipers. Delay fuze, activated by the trees, usually gives a ground burst similar to that obtained by quick fuze in open terrain. The proportion of delay fuze to quick fuze is usually greater than normal. Heavy undergrowth smothers the shell burst, limiting the burst radius; therefore, artillery fire can be brought in closer to friendly frontlines, though more ammunition must be used to obtain good area coverage. Care must be taken to insure that tree bursts do not occur over friendly troops. Chemical shell may be very effective because of the longer target exposure resulting from low wind speeds and stable meteorological conditions under the jungle canopy. For information concerning nuclear weapons effects in forests, see FM 101-31.

154. Communication

Radios are used extensively by forward observers and survey parties; relay stations, such as aircraft, are normally required. Telephone lines are laid when possible, and forward switching centrals are often installed. Wire laying by light aircraft is economical and may be employed when possible. Wire crews must be protected while laying and repairing wire, and extra men are required to act as porters.

Section VII. DESERT OPERATIONS

155. General

The principal problems confronting artillery engaged in desert warfare (FM 31-25) are observation and maintenance. Desert terrain varies widely from low, flat sandy plains to high, rocky, mountainous areas (FM 100-5). Temperatures also vary from torrid to subzero according to the latitude and altitude. Arid climate, with lack of vegetation, is the only common characteristic. Therefore, artillery tactics and plans must be varied to suit the conditions of terrain and climate.

156. Observation

a. Ground observation of artillery fires in hot, flat, sandy desert areas is very difficult because of heat waves, mirages, lack of elevated positions, and frequent dust storms. Distances observed over flat terrain are deceiving and are usually underestimated. The absence of identifiable landmarks reduces the value of maps. Aerial observation, while much better than ground observation, is still hampered by the above factors.

b. Observation in mountainous desert areas is subject to the limitations discussed under mountain operations.

157. Maintenance

Frequent duststorms and sandstorms require a constant, intensive maintenance program to protect all materiel from the abrasive action of the fine dust and sand. Wear on gun tubes, slides, and all bearing surfaces, and scouring and pitting of optical instruments is greatly increased by exposure to these conditions.

Section VIII. COMBAT IN TOWNS

158. General

As most towns are readily bypassed without materially affecting the commander's plan of maneuver, only those which occupy key terrain or those which constitute islands of resistance so large as to be serious threats to future operations will normally be attacked. Outlying areas where there are good fields of fire become the enemy's first line of defense. This line may be fortified with anything from hastily prepared positions to mutually supporting concrete emplacements. If these positions are penetrated, the defender must fall back to the town.

159. Field Artillery Support of the Attack

a. After the town has been isolated, the artillery commander must prepare to support the two remaining phases of the attack. In supporting the second phase, which is to penetrate the defender's initial position, artillery will be centralized and operate in a normal manner. The artillery commander must have artillery capable of destroying fortifications and of sufficient range to neutralize enemy artillery and provide interdiction fires. In the second phase, the forces holding the town will normally have good observation, thus forcing friendly troops to displace at night or along concealed routes. With the successful completion of this phase, the artillery must displace quickly to support the third phase of the attack.

b. The third phase of the attack, which consists of the advance through the town, will often require the force commander to decentralize his command into small units which must attack through separate corridors of the town. This action may necessitate some decentralization of the artillery, particularly the direct fire elements. Observation is usually poor and the artillery must depend almost entirely on forward observers for conduct of fire. Direct fire artillery should be self-propelled and of sufficient firepower to destroy designated buildings. Artillery providing close support to attacking troops must be capable of high-angle fire and, if opposing

forces are in close proximity, it may be necessary to withdraw the attacking forces while artillery concentrations are being fired. The greater part of indirect fires, however, will be precision fires.

c. Once a built-up area has been hit by nuclear weapons it may become a formidable obstacle and may provide an excellent defensive area. The plan for employment of nuclear weapons against a town should provide for leaving relatively clear passage through some portion of the town. The enemy must be prevented from re-occupying the town after it has been attacked by nuclear weapons. For further information concerning nuclear weapons effects against built-up areas, see FM 101-31.

160. Field Artillery support of the Defense

In the defense of towns, artillery is so emplaced that it can fire against any attempted envelopment of the town or against hostile forces within range that are attempting to bypass the town. The supporting artillery must also be able to deliver the preponderance of its firepower on the critical avenues of approach and to fire final protective fires in the form of barrages covering close-in approaches, such as streets, open areas, and areas containing lightly constructed buildings. If the enemy makes a penetration, the artillery should be able to deliver the preponderance of its firepower against the penetration, and support the counterattack.

Section IX. FIELD ARTILLERY IN RIVER CROSSINGS

161. General

Wide unfordable rivers exercise considerable influence on military operations because they impose restrictions on movement and maneuver. They constitute obstacles to attack and afford natural lines of resistance for defense. For details of river crossing operations, see FM 31-60.

162. Support of the Crossing

a. The crossing is supported from positions as far forward as secrecy permits. These positions are occupied under cover at darkness or during periods of low visibility at the latest possible time prior to the attack. When the defender has the capability of employing nuclear weapons, the attacker must avoid forming large vulnerable targets on either side of the river. Movements from rear assembly areas are continuous through the crossing sites.

b. Battle group artillery or direct support artillery *may* begin to displace to the far bank when the first phase objectives have been seized. These units frequently will cross the river on DUKW's

and rafts. Battle group artillery may cross the river in personnel carriers. Forward observers and liaison personnel will cross with the assault elements. The use of helicopters to move light artillery across the river will materially reduce congestion at crossing sites. This is of particular importance when the enemy has an atomic capability. Resupply of ammunition may also be accomplished by helicopter.

c. General support artillery units must be prepared to provide close support for the assaulting troops during the displacement of close support artillery units.

d. The major part of the artillery crosses the river when it is determined that continuous effective support can be delivered from the new positions.

e. Fire support planning must be detailed and coordinated at all echelons. Centralized control of artillery is maintained where possible to provide fire when and where needed. Where crossings are made on a front sufficiently broad to preclude centralized control of artillery during the crossing, centralized control is regained as early as practicable following the crossing. Where necessary, targets for nuclear weapons may be selected to insure crossing the obstacle rather than to inflict maximum initial damage on the enemy. Properly employed, nuclear weapons may eliminate effective small arms fire on the crossing site and may also eliminate effective artillery fire from the crossing site by destroying or neutralizing the enemy artillery or its observation. Thus employment of nuclear weapons will speed up the timing of the operation by causing some phases to merge with others or to be eliminated completely; e.g., phase I, the removal of effective direct small arms fire from the crossing sites, may be merged with phase II, the denial of ground observed artillery fire on the sites. In river crossing operations, consideration should be given to maintaining a reserve of nuclear weapons for employment after the assault crossing against the mobile counterattacking forces of the defender. The use of air transported troops to lend flexibility and speed to crossing operations requires close and detailed coordination of supporting fires.

f. When nuclear weapons are employed, initial objections are normally deeper than when only nonnuclear weapons are employed. These objectives, which may include objectives for airborne assault, are selected to isolate the defending forces, destroy them in place with nuclear weapons and offensive maneuver, or force them out of position. Rapid exploitation follows the assault across the river obstacle.

g. Prior to, during, or immediately after the crossing, artillery may be required to—

- (1) Furnish illumination either with searchlight or illuminating shells.
- (2) Smoke enemy observation.
- (3) Screen movement and crossing noises of the attack force by fire.
- (4) Support feints and demonstrations.

163. Field Artillery Support of a Defense at a River Line

A river obstacle allows the assignment of extremely wide frontages. To effectively organize the defense, the unit is assigned great depth in which to accomplish its mission, giving it space for considerable movement and dispersion.

a. A river obstacle favors the mobile defense. The defense is organized depending upon the terrain, enemy situation, and forces available. Artillery is employed to cover all probable crossing sites. It is also disposed in depth, capable of massing fires on critical points in the enemy's rear area. Elements of the artillery may be disposed on the far shore in support of security forces. Of particular importance is the necessity for coordination to insure the withdrawal of the artillery with the security forces across the river. Emphasis is placed on fires which assist in canalizing the enemy, stall his attack astride the river, and destroy him by fire and counterattack. When the enemy's main crossing is disclosed, artillery must be prepared to support the counterattack with the bulk of its fires. Emphasis is placed on maintenance of probable routes of displacement and in preparation of fire plans and supplementary positions to support all counterattack plans.

b. The considerations in the employment of artillery for the position defense are similar to those described in *a* above. Emphasis is placed on preventing the enemy crossing of the river.

c. When the number of suitable crossing sites available to the enemy is limited, the nuclear fire plan includes provisions for the disruption of the approaches to the crossing sites on either or both sides of the river depending on the defensive maneuver plan. A target analysis is made of the area within the defensive position for the possible elimination of enemy airheads and bridgeheads by using nuclear fires. Nuclear fires against the enemy on the friendly side of the river are exploited by mobile reserves. Nuclear fires on the enemy side of the river line should be exploited with other artillery fire.

Section X. COASTAL FRONTIER DEFENSE

164. General

Coastal frontier defense includes all measures taken by the armed forces to provide protection against any form of attack at or near the shoreline and within the zone immediately to the rear. The basic consideration of the defending force is the defeat and destruction of the invading force before it lands or while it is attempting to gain a beachhead. The coastal frontier defense mission of the Navy is to meet and defeat the enemy while he is still at sea; of the Air Force to counter enemy air action and carry the defensive to the enemy both at sea and on the land; of the Army to meet and defeat the enemy prior to landing or after he has landed. When artillery is employed in coastal frontier defense it will usually be as a part of a force of all arms, although it is possible that it may be required to act alone or in conjunction with air or naval forces.

165. Field Artillery Employment

Artillery as a member of a combined arms force will be primarily concerned with destroying hostile landing waves before they can gain a lodgment on the shore and supporting ground troops in the reduction of any beachhead which may be established. Field artillery gunnery techniques are described in FM 6-40 and other 6-series manuals. Considerations incident to attack of waterborne targets are described in FM 44-4.

CHAPTER 9

TARGET INTELLIGENCE AND ANALYSIS

Section I. GENERAL

166. Scope

This chapter outlines the intelligence procedures which are used for the location, confirmation, and analysis of surface targets to be attacked by all available means of fire support. Section II deals with target intelligence. Section III describes the functions and use of target intelligence in target analysis. See FM 30-5 for a discussion of combat intelligence. Artillery intelligence is a part of combat intelligence.

167. Use of Field Artillery Agencies

Artillery intelligence agencies are part of the intelligence gathering agencies of the force as a whole. The force G2 in furtherance of his collection plan takes maximum advantage of artillery agencies in producing combat intelligence. The discharge of this additional responsibility is enhanced by the artillery's efficient communication system, special observation equipment, and ability to coordinate large numbers of observers.

Section II. TARGET INTELLIGENCE

168. General

a. Target intelligence is knowledge acquired by the collection and processing of all available information pertaining to possible or actual targets. Artillery intelligence agencies are primarily concerned with the timely recognition, accurate determination of characteristics, and prompt reporting of targets whose destruction or neutralization will assist the supported unit in accomplishing its mission. Artillery intelligence agencies are also concerned with surveillance of targets both before and after their attack by fire and for collecting and reporting all information of military significance.

b. Full exploitation of artillery firepower available to the commander depends on the volume, coverage, and effective use of available target information and intelligence. The continuous interchange of all information among representatives of fire support

agencies contributes to the fulfillment of common intelligence needs and to the end result of target intelligence: delivery of effective fire against the enemy.

c. Target intelligence begins with target acquisition, which is the detection, identification (including friend or foe) and three-dimensional location of a target in relation to a known control point or datum, and with sufficient accuracy and detail to permit the effective employment of appropriate weapons by the commander.

169. Effect of Nuclear Weapons on Target Intelligence

a. The target collection effort must be aggressive and continuous to exploit weapons capabilities. Communication facilities must be efficiently utilized to insure that target information is disseminated in the shortest possible time.

b. The employment of artillery, including artillery with a nuclear capability, requires consideration of the nature, characteristics, and capabilities of the target to determine suitability for attack.

c. Information leading to the development of nuclear targets normally will be derived from the evaluated summation of many reports.

d. Concentration of enemy personnel and materiel will probably be of extremely short duration. To engage these targets before they disperse, target information must be processed rapidly.

170. Post Strike Analysis

a. After the attack of a target, an analysis is made to determine the accuracy and effectiveness of the fire. The following should be investigated:

- (1) Number of casualties.
- (2) Amount of damage.
- (3) Effect against enemy fortifications.
- (4) Effectiveness of enemy countermeasures.
- (5) The effect of fires on enemy morale and efficiency.
- (6) Effect on enemy tactics.
- (7) Verification, if possible, of the accuracy of the location of enemy installations attacked.
- (8) Effect of fires on enemy reinforcement and resupply capabilities.

b. Information for post strike analysis can be obtained from the following:

- (1) Agencies that obtained the target information initially.
- (2) Photographic interpretation.

- (3) Inspection of target area after capture.
- (4) Interrogation of prisoner of war reports.
- (5) Captured documents, reports, diaries, and letters.
- (6) Friendly civilian personnel who observed the result of fire.
- (7) Clandestine means.
- (8) Communications and electronic intelligence means.

c. Post strike analysis is a responsibility of the headquarters ordering the fires. Post strike analyses may be made by any fire support agency capable of obtaining the necessary information. The fire support plan may contain instructions for post strike analysis.

d. Artillery agencies make the post strike analyses report and forward them to the artillery S2. Pertinent data from these reports are entered on appropriate file cards. This data is analyzed to determine the comparative effectiveness of artillery weapons, techniques, and ammunition in the attack of specific types of targets. The artillery commander uses pertinent information regarding enemy doctrine and practices to increase the effectiveness of artillery fire. All pertinent information is disseminated to higher, lower, and adjacent echelons.

e. Artillery agencies are responsible for predicting radiological fallout from friendly nuclear weapons. Chemical corps agencies are responsible for predicting fallout from enemy weapons, and for radiological survey of both enemy and friendly weapons.

171. Counterfire, Countermortar, and Counterbattery Responsibilities

a. Battle group artillery plays an important part in counterfire operations (FM 7-21). The battle group counterfire agency normally operates under the centralized control of the battle group artillery commander who is responsible for the coordination and direction of its operations.

b. Division artillery has responsibility for the supervision of countermortar functions within the division (pars. 197-201). Mortars, because of their mobility and relatively short range, frequently are fired from temporary positions and then displaced rapidly to avoid counterfire. Speed in obtaining, evaluating, and disseminating countermortar information must be emphasized.

c. Corps artillery has responsibility for counterbattery functions within the corps sector (pars. 192-196). A clear distinction between countermortar and counterbattery functions is not always possible or desirable. Therefore, the most appropriate means available must be utilized to locate and attack the weapon concerned.

d. Army artillery has responsibility for obtaining information on enemy long-range field artillery positions beyond the capability of the corps. Normally, friendly long-range field artillery units are retained under field army control which gives that echelon the capability of engaging these targets. Information on enemy long-range weapons will be sought vigorously. Although all sources of information must be fully exploited, visual, electronic, and photo air reconnaissance will normally be required to give current information of the locations of these installations.

172. Counterflak

a. Artillery intelligence agencies continuously seek information on the location of hostile air defense artillery which can interfere with close air support operations. Enemy air defense weapons can be effectively neutralized during air strikes and losses or damage to friendly aircraft minimized by accurately placed artillery fire.

b. Air Force intelligence agencies in conjunction with Army intelligence agencies insure dissemination of the latest target information on enemy air defense weapons. Corps artillery S2's normally publish and maintain a current counterflak list, when the situation permits. Division artillery S2's publish extracts from this list to facilitate flak suppression fires of the division artillery.

173. Collection of Target Information

Target information is collected by continuous planning and systematic direction of the collection efforts. Effective utilization of the sources and agencies available for target information depends on complete knowledge by the artillery S2 of their capabilities and limitations.

a. *Collection Plan.* A formal collection plan (FM 30-5) is prepared by the force G2 (S2). The artillery S2 more frequently will limit his collection plan to a mental analysis of the information desired and then assign collection agencies to procure the information. The observation plan and instructions for coordinating observation will provide for full utilization of all collection agencies. The observation plan and instructions for coordination of observation may be issued orally, in written fragmentary form, in the force operation order, in the intelligence annex, or in the reconnaissance and observation appendix to the intelligence annex.

b. *Sources and Agencies.* A source is the actual origin from which information is obtained. For a complete discussion of intelligence sources and agencies, see FM 30-5. Intelligence sources from which target information is obtained include enemy military personnel, enemy documents, enemy materiel, enemy signal communications,

refugees, aerial photographs, and tactical studies. The following agencies are particularly useful in collecting target information:

- (1) Observation battalion (flash, sound, and radar ranging).
- (2) Forward observers and observation posts.
- (3) Army aviation (visual observation and limited photographic coverage).
- (4) Shelling reports and crater analysis. Chapter 10 contains detailed instructions on shell and crater analysis reports.
- (5) Tactical air reconnaissance.
 - (a) Visual reconnaissance.
 - (b) Photographic and electronic coverage of areas and targets.
 - (c) Weather reconnaissance.
- (6) Patrols and reconnaissance personnel.
- (7) Photographic interpretation. The importance of rapid photographic interpretation must be emphasized. The film must be processed, edited, and interpreted and information must be disseminated with all speed possible. Detailed photographic interpretation to include comparative interpretation is an efficient means of locating targets at all levels.
- (8) Prisoner of war interrogation personnel.
- (9) Clandestine agencies requested through the force G2.
- (10) United States Army Security Agency Units.

174. Processing of Target Information

a. Processing is the means by which information is transformed into intelligence. A complete discussion of the intelligence process is found in FM 30-5. The sequence for processing information for combat intelligence is applicable for processing information for artillery intelligence. The three basic elements are recording, evaluation, and interpretation.

b. Recording is the systematic arrangement of information to facilitate its processing into intelligence. The recording function supports evaluation and interpretation because these are the decisive actions. Unless recording of information is accomplished quickly and economically, speedy evaluation and interpretation cannot be effected and the timeliness of intelligence suffers. Procedures used in recording should be simple. For recording techniques, see chapter 10.

c. Evaluation is the appraisal of an item of information to determine its pertinence, reliability, and accuracy.

- (1) *Pertinence.* Information is examined immediately after

its receipt by the S2 to determine its relevancy and value. Is it information of the enemy or of the characteristics of the area of operations? Is it information of value to the unit or to higher, lower, or adjacent units? Is it needed immediately and, if so, by whom? Is it of future value? These questions should be answered in estimating the pertinence of the information.

- (2) *Reliability.* The reliability of the source and of the collecting agency must be examined before the information can be evaluated. To what extent is the source or agency accurate and reliable? Has the agency sufficient training, experience, and ability to report accurately the information in question? Under conditions existing at the time (time and space, means employed, visibility, etc.), could the information have been obtained? These questions should be answered in estimating reliability of the source and the collecting agency.
- (3) *Accuracy.* The accuracy of the information must be examined separately from the reliability of the source or collecting agency. Is the purported fact or event at all possible? Does it agree or disagree with known facts? Can the information be confirmed or corroborated from a different source or agency? If the information is at variance with other information and the conflicting items cannot be reconciled, which information is more likely to be correct? These questions should be answered in estimating the accuracy of each item of information.

d. Interpretation is the final step in processing. The evaluated information is analyzed to determine its significance with respect to information or intelligence on hand and conclusions drawn therefrom. Correct interpretation will lead to accurate conclusions concerning target information. Proper interpretation of target information is essential to the employment of effective fire support. Interpretation of target information is particularly significant when nuclear fire is contemplated or employed.

175. Dissemination and Use of Field Artillery Intelligence

The artillery intelligence cycle is culminated when the artillery intelligence is disseminated and put to use. Since artillery intelligence is a part of combat intelligence, the intelligence must be forwarded promptly to the appropriate G2.

a. *Dissemination.* Disseminated information should be pertinent, concise, clear, accurate, and timely. The recipient should not be burdened with unnecessary or irrelevant details or with illogically presented information.

- (1) Target intelligence is disseminated by most suitable means such as radio, wire, written messages, conferences, or intelligence documents.
- (2) Representatives of fire support agencies and of the supported unit keep informed of and transmit all available information to their parent units.

b. *Intelligence Documents.* Intelligence documents commonly used for disseminating combat intelligence and information are discussed in FM 30-5. Target information may also be disseminated by the following means:

- (1) *Hostile battery, mortar, and flak lists.* Lists of hostile locations are compiled for all interested agencies. Confirmed and suspect locations are listed separately. The lists are numbered, dated, and published at the direction of the appropriate commander and are kept current by publishing additions, deletions, or changes in paragraph 5 of the artillery intelligence bulletin or in annexes to the periodic intelligence report of the supported force.
- (2) *Artillery intelligence and information bulletins* (app. II). Artillery intelligence bulletins may be published at the direction of the corps artillery and division artillery commanders. Artillery information bulletins are published by the artillery commander (officer) at army or theater army levels.
- (3) *Target summaries* (app. II). Target summaries consist of hostile battery, mortar and flak lists, and general target locations compiled from latest available information. Complete target summaries are numbered, dated, and published at the direction of the appropriate commander. They are kept up to date by publishing additions, deletions, and changes in paragraph 5 of the artillery intelligence bulletin or in annexes to the periodic intelligence report of the supported force. The target summary may indicate a recommended priority for each target (par. 179).
- (4) *Artillery periodic intelligence report* (app. II). The artillery periodic intelligence reports (corps and army artillery only) summarize the enemy capabilities, situation, operations, and weather and terrain. A separate artillery periodic intelligence report may be prepared, or the information normally contained therein may be incorporated in the periodic intelligence report of the supported force. The period of time to be covered in the report is specified by higher headquarters or by the appropriate commander

in the absence of instructions. Normally the report covers a 24-hour period.

c. Use of Artillery Intelligence.

- (1) *Force G2.* The force G2 makes use of artillery intelligence in determining relative probability of adoption of enemy capabilities. **Location, disposition, caliber, and activity** of hostile artillery or mortars furnish indications of enemy action which, when analyzed with respect to other information, assist in estimating enemy capabilities.
- (2) *Artillery use.* Artillery intelligence is used—
 - (a) To assist in the destruction or neutralization of located targets.
 - (b) As a factor in allocation of artillery to lower echelons.
 - (c) As a factor in requesting additional artillery from higher headquarters.
 - (d) To assist the commander in the disposition of friendly artillery and organization for combat.
 - (e) As a vital consideration, along with the mission of the force, in determining the available supply rate of ammunition for subordinate artillery echelons.
 - (f) To assist commanders in determining the required supply rate to be requested from higher headquarters for planned operations.
 - (g) In planning future operations.

Section III. TARGET ANALYSIS

176. General

a. Target analysis is the examination of potential surface targets to determine their military importance, their relative priority for attack, and the capabilities of available weapons for such attack. This analysis is performed for targets of opportunity as well as for targets for which prearranged fires have been planned. The length of time and amount of detail involved in making a target analysis depends on the amount of information available concerning the target, availability of means of attack, the degree of coordination required, and the urgency for attack of the target. The analysis may consist of a rapid, mental calculation at lower artillery echelons or a detailed written analysis at division, corps, or army artillery. Target analysis will assist the commander in delivering effective fires.

b. Normally, written target analyses will be made only when time permits and the analyses are needed in connection with the use of nuclear weapons or in connection with detailed staff planning for future operations. Attack of heavily fortified positions, deliber-

ate river crossings, and major amphibious landings and airborne assaults normally require detailed target analyses during the planning phase of the operation.

177. Target Analysis Process

a. A precise form for making target analysis such as a checklist or similar document, may be used. The details of target analysis, although generally the same at all echelons, vary widely in magnitude. The factors to be considered in analysis are shown in figure 9.

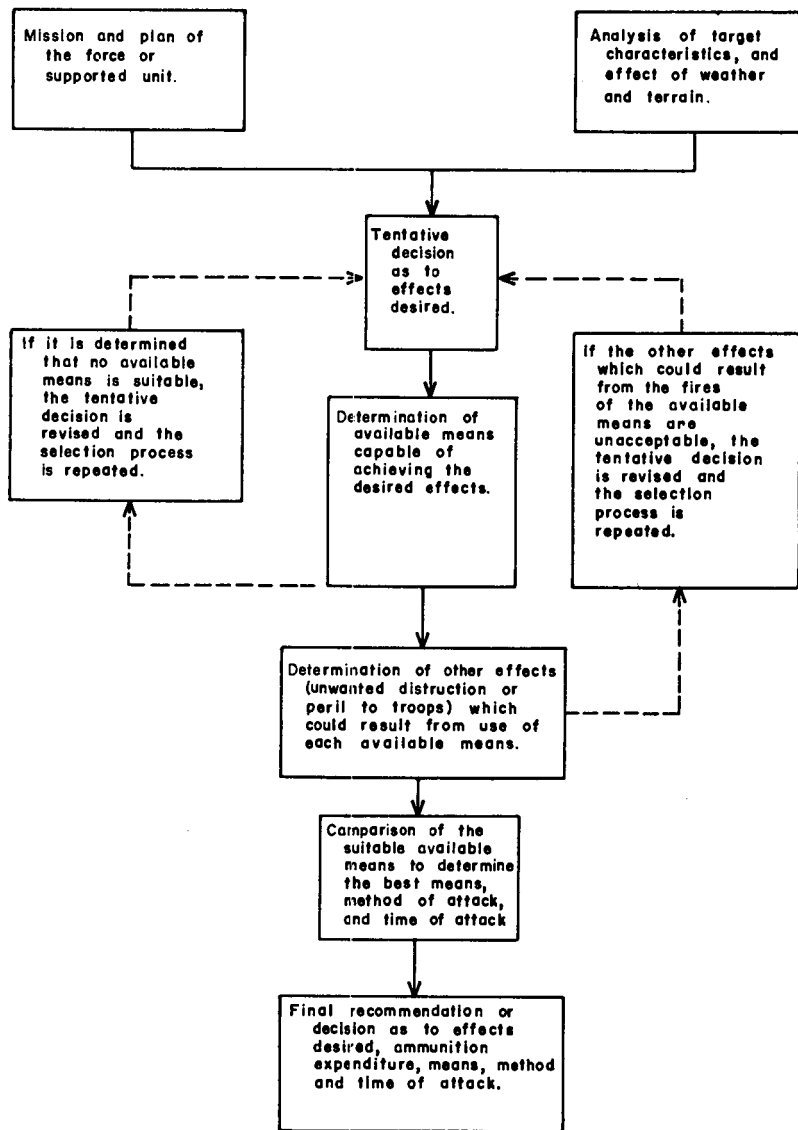


Figure 9. Process of target analysis.

b. When it appears, after a brief analysis, that a target may be suitable for attack by nuclear means, the FSCC or comparable fire support coordination agency is notified.

c. A form for use in making a target analysis and a procedure for special weapons target analysis are shown in appendix II.

178. Mission of the Supported Force

a. The concept of operation as announced by the commander to accomplish the mission becomes the basic consideration in making a target analysis. Supporting firepower is disposed to aid the accomplishment of the mission. The nature and characteristics of the target do not in themselves dictate the method of attack. The importance of the target, as measured by its capability to influence the operation, is an important consideration.

b. Because of the potential effect of nuclear firepower, the integration of nuclear fires with the scheme of maneuver or a plan of defense is of great importance. When possible, the tactical advantage gained through the use of nuclear weapons should be fully and expeditiously exploited through maneuver. For this reason, the force commander may desire to make the decision concerning the employment of nuclear weapons, or he may delegate all or part of this authority to the fire support coordinator and major subordinate commanders. When time permits, a detailed target analysis is made prior to the employment of nuclear weapons.

c. Standing operating procedures and policies of the appropriate commander must be considered early in making a target analysis. These policies must be well known to all fire support agencies to insure rapid, expeditious engagement of targets.

179. Target Characteristics and Effect of Weather and Terrain

a. *General.* Characteristics of the target include all features of the target and target area that may influence the decision to attack it. Targets about which little is known may, and often should be, taken under fire. However, the more that is known about a target, the greater is the likelihood that it will be suitably attacked. Full use of available target intelligence should be made when conducting target analyses. The artillery S2 is responsible for ascertaining the target characteristics and recommending to the fire support coordinator the relative priority of attack for each target. The principal target characteristics to be considered are listed below:

(1) *Nature of the target.*

(a) Composition.

(b) Size and shape.

- (c) Vulnerability.
 - (d) Mobility.
 - (e) Recuperability.
- (2) *Location of the target.* The location of the target may indicate or eliminate a particular means of delivery. The proximity of the target to friendly troops, and to enemy installations protected by the Geneva Convention should be considered. The probable accuracy of the target location should be analyzed.

b. Terrain and Weather.

- (1) *Terrain.* Terrain in the target area has a direct bearing on the vulnerability of the target. Rugged terrain affords considerable natural cover and makes target location difficult. Targets that are well defiladed by terrain sometimes can only be reached by high-angle fire or by aircraft. Certain terrain provides complete defilade from some angles of approach but not from others, thereby influencing the selection of a means of attack and frequently necessitating the movement of a weapon to a position from which it can deliver effective fire. The nature of the vegetation in the target area should be considered in the selection of ammunition. Information as to the relief, surface soil conditions, and vegetation in the target area is essential when considering nuclear attack. Uneven terrain frequently limits surveillance of fires to aerial observation and in some instances completely prevents observation of fires. Uneven terrain limits sound ranging coverage, reduces radar coverage, and may reduce the effect of nuclear weapons.
- (2) *Weather.* Weather greatly affects the capability of attack by air and to a lesser degree by naval gunfire and artillery. It is of special importance in evaluating a target for nuclear or chemical attack. Information as to visibility at ground level cloud cover, and ceiling is a minimum requirement.
- (3) *Joint effects.* Terrain and weather jointly affect visibility of the target and may require further study to determine a suitable means and method of attack.

c. Target Capabilities. Target capability is the ability, actual or potential, of a target to influence the accomplishment of the supported unit's mission. An estimate is made as to the time a target can exercise its capability. Target capability is an important consideration in determining the priority assigned to the attack of a target and the weight of fire delivered on a target. The time of

attack, the effect desired, and the selection of means to be used are influenced by considering target capabilities.

- (1) *Priority for attack.* There is rarely sufficient fire support to attack simultaneously all targets that it may be desirable to engage. Accordingly, the attack of these targets is usually spread over a period of time. On occasion, owing to such factors as ammunition shortage or inadequacy of available delivery means, it may not be possible to attack all known targets. Therefore, it is often desirable to determine the relative priority of targets for attack. Intelligence and operations representatives work together in assigning priorities. Priorities do not necessarily indicate the time of attack or the sequence in which targets will be attacked. The priority assigned a specific target will frequently depend on the echelon assigning the priority and the mission of the supported unit. A top priority target at direct support battalion or battle group artillery level may have a much lower priority at corps artillery level.
- (2) *Priority classification.* As a guide in determining priorities for attack of targets, the following may be used:
 - (a) *Priority I.* Targets capable of preventing the execution of the plan of action.
 - (b) *Priority II.* Targets capable of immediate serious interference with the plan of action.
 - (c) *Priority III.* Targets capable of ultimate serious interference with the execution of the plan of action.
 - (d) *Priority IV.* Targets capable of limited interference with the execution of the plan of action.

d. *Enemy Countermeasures.* The capability of the enemy to interfere with or to prevent effective delivery of fires and his ability to minimize the effects of the fire as ascertained, if possible. These factors directly influence the delivery means to be used and the protection or assistance to be provided the delivery means. Enemy countermeasures which can be expected include counterbattery, air defense artillery fire, electronic jamming, and the attack of position areas by tactical aircraft and guerilla attack.

180. Selection of Type Effect

After examining the characteristics of the target, a tentative decision is made as to the type of effect and degree of effectiveness desired. If suitable weapons and ammunition are available, the tentative decision is confirmed. Common types of fire that may be selected are described below:

a. Destruction fires are artillery fires delivered for the sole purpose of destroying material objects. Destruction fires may be accompanied by penetration, blast effect, nuclear radiation, or incendiary action or by a combination of these actions.

b. Neutralization fires are fires which are delivered to cause casualties, to hamper and interrupt the firing of weapons, movement, or action and to reduce the combat efficiency of enemy personnel. A satisfactory degree of neutralization sometimes can be accomplished by smoking a target or by screening a friendly force from the target. Illumination at night may assist in effecting neutralization.

c. Harrassing fires are fires of less intensity than neutralization, designed to inflict losses or, by threat of losses, to disturb the rest of the enemy troops, to curtail movement, and in general, to lower morale.

d. Interdiction fires are fires placed on an area or point to prevent the enemy from using the area or point. Interdiction fire is usually of less intensity than neutralization fire.

181. Determination of Suitable Weapons

a. *General.* The characteristics of available fire support means must be considered to determine which means is most capable of producing the desired effect on the target. A less capable means may be used if time or ammunition limitations preclude use of the most effective means.

b. *Assignment of Prearranged Missions.* Priority in the assignment of prearranged missions to supporting arms should ordinarily be in the order of artillery, naval gunfire, and air support. Air support ordinarily is not assigned a mission which can be accomplished as well by artillery or naval gunfire, and naval gunfire is not assigned a mission that is better suited to artillery. This principle, however, must not adversely influence the prompt delivery of available naval gunfire support nor operate to restrict the use of air support when that arm is available and capable of delivering the support required.

c. *Firepower.* Any firepower selected must be capable of producing the desired effect on the target and must be able to do so without causing excessive undesirable effects on the target and in the target area.

- (1) *Weapons.* The caliber or type, rate of fire, and refire capability of a weapon must be considered, since it is possible that the desired effect may be achieved by one weapon or by more than one weapon of the same type or by weapons of different types.

- (2) *Ammunition.* The target may dictate the type of weapon and ammunition to use. Neutralization, harassing, and interdiction of a target can be achieved by fires of lesser intensity than those required for destruction of a target. The available supply rate is constantly considered, and greatest effect possible must be achieved for the amount of ammunition expended.
- (3) *Personnel targets.* All types of firepower are effective against personnel. Attack of personnel in the open by light artillery, light naval weapons, and fighter bombers is appropriate. Projectiles and fragmentation bombs with variable time fuzes are effective against personnel in the open. Nuclear firepower is the greatest casualty producer, but its employment may be limited to the most profitable targets.
- (4) *Defensive works.* The heavier weapons are best suited to the destruction or neutralization of bunkers, pillboxes, dugouts with heavy overhead cover, and other defensive works. Chemical agents are effective in neutralizing these positions. For penetration capabilities of various weapons, see TM 9-1907 and FM 6-40.
- (5) *Materiel targets.* Materiel targets may be rendered ineffective by neutralization of the operating personnel or by destruction of the materiel itself. The problems involved in destruction of materiel targets are similar to those in destruction of defensive works. Materiel targets are frequently accompanied by personnel and require firepower means consistent with both target requirements. Air attack with napalm is particularly effective against materiel targets. Either heavy or very heavy cannon, antitank and similar type missiles, heavy naval gunfire, or air bombardment is usually required for destruction of heavier types of materiel. Properly delivered nuclear fire is effective against all materiel targets.
- (6) *Large target areas.* Frequently, several targets are located in one large area. Nuclear firepower is particularly effective against a large area where adequate coverage is either beyond the capability of nonnuclear weapons or the use of nonnuclear weapons would result in expenditure of an excessive quantity of ammunition.

d. Troop Safety. The firepower means selected must be capable of engaging the target without adversely affecting friendly troops. The importance of accurately delivered firepower close to friendly lines must be emphasized. Supported troops must have confidence in supporting fire and this confidence must be carefully fostered.

- (1) *Accuracy of the means.* The means selected must have sufficient accuracy to accomplish the desired result. Generally, weapons with a large probable error are not used for close fires. Naval gunfire delivered in very close support usually requires adjustment. Close-in targets for air strikes should be carefully marked, location of friendly elements should be made known to the aircraft, and the strike should be controlled by an air controller in the air or on the ground.
- (2) *Effects on target area.* If friendly troops are to move into an area immediately after delivery of fire, the effect of the fire must not deny movement or safe passage of the troops. Lingering effects from nuclear, chemical, or biological attack must be considered. Overdestruction of the target may result in debris which is an obstacle to passage by infantry and armored elements and may actually strengthen the enemy defenses.
- (3) *Effects of weather.* The weather conditions in the target area must be considered. The average wind effect, if blowing toward friendly troops, may prohibit close nuclear, chemical, or biological attack. Heavily vegetated areas, if inflammable, may be ignited by incendiaries and the resultant grass and timber fires may jeopardize friendly troops.

e. Other Factors. Other factors to consider in determining a suitable weapon for the attack of a target are the need for speed, the dependability of the weapon, its vulnerability to enemy counter-measures, and its ability to provide massed fire.

182. Method of Attack

Having selected the type and amount of firepower and the means of delivery, the effectiveness of the fire can be further increased by the method of attack. The factors which determine the method of attack are—

a. Location of the Center of Impact. In a small target area the fire is placed on the center of the area. In a large target area, separate centers of impact may be selected to insure adequate coverage. The terrain in the target area is studied and fire is placed to minimize the protection afforded the enemy by natural cover. The determination of a suitable height of burst is important to the success of a nuclear attack.

b. Surprise Fire. The effectiveness of fire can be materially improved by the delivery of fire without adjustment to obtain surprise. Surprise reduces the effectiveness of enemy protective

measures and countermeasures. The principal means of obtaining surprise fire is to place a large amount of fire on an area in a short period of time, either by nuclear fires or by using time on target (TOT) method (FM 6-40) with nonnuclear fires. The time on target method requires simultaneous arrival at the target of fire from several units; success is dependent on accurate survey, registration, and the application of meteorological corrections. If the number of units available is not sufficient for an effective time on target, then the use of weapons with a high rate of fire is desirable.

c. Density of Fire. Uniform density of fire on all parts of the target area is normally desirable. This is accomplished by attacking parts of the area successively by one unit or by several units simultaneously, the latter being more effective.

d. Duration of Fire. Although intense fire of short duration produces the greatest casualty effect, the mission may require fire on a target over a longer period of time. The availability of ammunition frequently will influence the duration and intensity of the fire. This is the case with harassing and interdiction fires where the objective is to curtail movement, to disrupt or intermittently deny use of communication routes to the enemy, and to keep the enemy unnecessarily alerted with a consequent loss of morale and efficiency.

183. Time of Attack

The time of attack selected for each target should insure maximum overall effectiveness of all available fires. The target having the highest priority for attack is not always attacked first nor is it always best to attack a target as soon as possible after it is located. Selection of time of attack is influenced primarily by the factors listed below.

a. Mobility of the Target. A fleeting target ordinarily has a higher priority for attack than a static target.

b. Recuperability of the Target. The time required for repair or replacement of the target by the enemy should be considered in selecting the time to attack the target. Additionally, the period of time during which the target is most critical to the supported unit should be estimated. A comparison of these times will indicate a desirable time of attack.

c. Limiting Factors. Although the mobility and recuperability indicate a desirable time for attack, other factors may necessitate attack at a less desirable time or with less desirable means. In some cases, they may even prevent any attack by fire. These factors are—

- (1) Nonavailability of suitable weapons.
- (2) Priority for attack.
- (3) Restrictions on firing.
- (4) Ammunition limitations.
- (5) Weather.

184. Decision

Having determined the most suitable means, method of attack, time of attack, and the ammunition to be expended, the decision is made. The decision sets forth the type and amount of fire to be employed, the units to fire, the grid reference and altitude of the desired center of impact, the height of burst if applicable, the time of attack, safety precautions, and the method of conducting post strike analysis.

CHAPTER 10

PROCEDURES AND TECHNIQUES FOR HANDLING TERRESTRIAL TARGET INFORMATION

Section I. GENERAL

185. Scope

This chapter describes the techniques and procedures suitable for processing and disseminating countermortar, counterbattery, and general target information. The conversion of target information into target intelligence is facilitated by the use of the procedures and techniques described herein.

186. Target Intelligence and Analysis

The procedures and techniques given in this chapter are closely associated with target intelligence and analysis. The general procedures involved in the collection and reporting of target information, the dissemination of target intelligence, and the use of target intelligence in target analysis are covered in chapter 9.

Section II. PROCESSING TARGET INFORMATION

187. General

The evaluation and interpretation of target information (ch. 9) is facilitated by recording and plotting the information on appropriate forms, records, and charts. Only the forms essential for a clear and concise record of targets should be maintained.

188. Terms

Certain terms, commonly used in processing target information, require explanation. The terms to be used and the criteria for their use are determined by the commander. The terrain, the enemy's employment of artillery, the weather, and characteristics of the enemy's weapons are considered. Examples of terms that may be required and suggested definitions are given below:

a. A *roving gun location* is a location from which a roving gun (SR 320-5-1) is fired or from which a roving gun is suspected of being fired.

b. An *artillery (mortar) location* is an area sufficiently small in

size to permit efficient attack with available weapons and which is known or suspected of containing enemy artillery weapons (mortars).

c. A *suspect artillery (mortar) location* is an artillery (mortar) location concerning which there is doubt as to whether it is occupied, unoccupied, or a dummy position.

d. A *confirmed artillery (mortar) location* is an enemy artillery (mortar) position, the existence and location of which has been verified by sufficient evidence to justify the conclusion that it is occupied by enemy artillery (mortars).

e. A *battery* is an enemy artillery position in which is found any of the following:

- (1) Two or more light or medium artillery weapons.
- (2) One or more heavy or very heavy artillery weapons.
- (3) One or more artillery missiles (launchers).

f. A *confirmed battery location* is an enemy artillery position, of which the existence and location have been verified by sufficient evidence to justify the conclusion that it is occupied by the number of weapons constituting an enemy battery of that caliber. An example of the criteria that may be used in confirming a battery is—

- (1) The location has an evaluated accuracy and is associated with a shelling or radar ranging report which indicates that an actual battery, not a deception device or installation, occupies the location.
- (2) Direct observation reveals that a battery occupies the location.

189. Recording Information

Artillery S2's maintain records of two general types: counter-battery (mortar) records and general target information records. These records are discussed below.

a. *Counterbattery (Mortar) Records.*

- (1) *The artillery counterfire information form (ACIF)* (par. 209) is used in recording and transmitting shelling reports (shelrep) and information relative to hostile battery (mortar) positions. Information from this form is plotted on the hostile battery (mortar) chart, the suspect location overlay, or the shelrep overlay.
- (2) *The counterbattery intelligence map* is a contour map or an aerial mosaic of suitable scale and accuracy. A contour map is preferred. This map is covered with an overlay on which are plotted appropriate unit boundaries, friendly

- (3) *The hostile battery (mortar) chart* is a map, photomap, or grid sheet of suitable scale and accuracy on which unit boundaries, friendly frontlines, and all confirmed artillery (mortar) locations or batteries are plotted.
- (4) *The suspect location overlay* is attached to the hostile battery (mortar) chart and is used in conjunction with that chart to show suspect locations.
- (5) *The shelrap overlay* is attached to the hostile battery (mortar) chart and is used in conjunction with that chart and its other attached overlays. On it are plotted areas shelled and rays indicating the direction toward enemy artillery (mortar) activity. The area shelled information on this overlay is valuable in preparing the material for inclusion in the periodic intelligence report (par. 175). The overlay may be changed, as necessary, or may be changed every 24 hours to coincide with the period covered by the periodic intelligence report.
- (6) *The roving gun location overlay*, when used, is attached to the hostile battery chart and is used in conjunction with that chart to show roving gun activity.
- (7) *The hostile artillery (mortar) file* is a card file in which is kept a Hostile Artillery (mortar) File Card. (DA Form

[illegible]

Figure 10. A type hostile artillery (mortar) file card.

2186-R) (fig. 10) for each suspect artillery (mortar) location, roving gun location, and confirmed artillery (mortar) or battery location. The location designation and its complete history are recorded on this card. Confirmed batteries (mortars), suspect batteries (mortars), and roving gun locations are filed in separate sections.

b. Records for General Target Information.

- (1) *The S2 journal* is a chronological record of events affecting the S2 section. The format and method of recording is as prescribed for a staff section journal.
- (2) *The S2 situation map* is a map or photomap of a suitable scale covered with an overlay on which are posted friendly and enemy frontlines, division and corps boundaries, and all available information of the enemy. The map is used for planning harassing and interdiction fires and fires to support an attack or defense. Fire plans should be checked against this map, and against hostile mortar or hostile charts and associated overlays at division and corps level to insure that all appropriate targets are attacked.
- (3) *The general target overlay* is an overlay used in conjunction with the S2 situation map on which are plotted all enemy locations determined to be targets.
- (4) *The general target file* is a file in which a file card is kept for each target located, except hostile artillery and mortar locations. The complete history of the target is recorded on this card. This file enables the S2 to correlate reports of enemy activity at a given location. The target file card is useful in the examination of overrun positions and in the evaluation of effectiveness of friendly fires and discerning enemy tactics and technique of employment. The Hostile Artillery (mortar) File Card (DA Form 2186-R) (fig. 10) or a similar card may be used for this purpose. This form may be reproduced locally on 10½ x 8-inch card.

190. Plotting Targets

The employment of a standard notational system facilitates the integration of information received in a variety of forms from numerous different agencies into a flexible, simple and usable form. Although experience or the requirements of a given situation may indicate improvisation, the following described system permits the recording of the bulk of information normally received in the S2 section:

a. Plot Description. Each location is plotted on the appropriate maps, charts, or overlays. The plot should include the location

name or number; time and date last reported active; description of the target, such as the number, caliber, and type of weapons; and the reporting source or agencies.

b. *Color Code.* Colors may be used in plotting to permit selection according to accuracy of location. For example—

Red—Accuracy of 100 meters or less
Blue—Accuracy between 101 and 200 meters
Brown—Accuracy between 201 and 300 meters
Green—Accuracy of 301 meters or over

c. *Identification of Reporting Source or Agency.* The abbreviations most commonly used to identify the reporting source or agency are—

SR—Sound Ranging
RR—Radar Ranging
FR—Flash Ranging
Z—Shelling Reports
TAF—Tactical Air Force Observer
POW—Prisoner of War
AOP—Air Observer
OP—Ground Observer
PI—Photo Interpreter

d. *Plot Designation.* Reported target locations may be designated by letter combinations or a concentration designation. Hostile artillery and mortars are generally designated by letter combinations and other targets by a concentration designation, which consists of a combination of letters and numbers.

- (1) Hostile artillery locations are lettered serially in the order located, as AA (1st location), AB (2d location), AC (3d location), * * * BA (27th location), * * *. These plots are placed on the suspect location overlay until confirmed. When a location is confirmed, the plot is removed from the suspect location overlay, plotted on the hostile battery chart, and the letter C (confirmed) is added to the name, as AAC, BAC, or BBC. The corresponding card in the hostile artillery file is changed accordingly.
- (2) Hostile mortar locations are lettered in the order located, in a manner similar to that used for designating hostile artillery locations: MAA (1st location), MAB (2d location), and MBB (28th location). These plots are placed on the suspect location overlay until confirmed. When the location is confirmed, the letter C is added to the name of the mortar location, the plot is removed from the suspect location overlay and placed on the hostile mortar chart, and the appropriate change is made in the hostile mortar file.

- (3) Locations other than hostile artillery or mortars are identified by concentration designations according to the concentration numbering system.

e. Description of Target. An abbreviated description of the target's composition is included as a part of the plot.

- (1) The description of hostile artillery locations includes the number, caliber (or size), and type of weapons, as—

4/M/H	—Four medium howitzers.
1/?/?	—One weapon; caliber (or size) and type doubtful.
3/H/?	—Three heavy weapons, type doubtful.
4/150/G	—Four 150-mm guns (show exact size or caliber when known).
1/MR/MSL	—One medium range missile (show exact size when known).

- (2) Mortar locations are described as to the number and size of mortars therein, as—

4/Lt	—Four light mortars.
1/?	—One mortar, size doubtful.
1/Hv	—One heavy mortar.

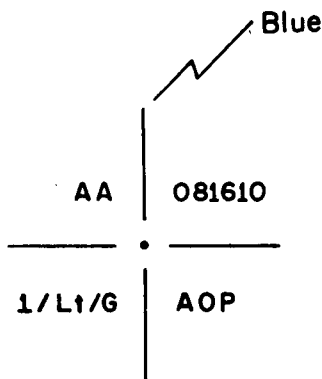
- (3) The larger enemy mortars may be classified as artillery and incorporated into counterbattery activities. Criteria for classifying enemy artillery and mortars should be established by the corps artillery commander, using order of battle intelligence and appropriate information of the enemy as a guide.

- (4) General target locations are described by using an appropriate military symbol (FM 21-30), abbreviation, or by improvising some other intelligible notation.

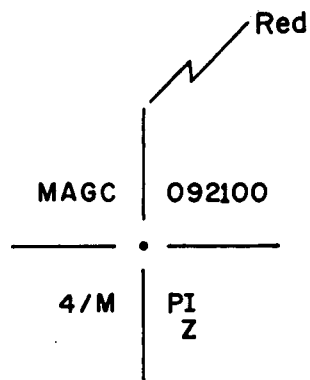
f. Completed Plot. The completed plot (fig. 11) consists of the basic symbol, appropriately colored, with notations placed in each quadrant. A commonly used system for entering notations is given below.

- (1) Upper left—letter combination or concentration number assigned to the location.
- (2) Upper right—date and time last active or reported. (If derived from photo interpretation report, the date and time the photo was taken are shown.)
- (3) Lower right—agency reporting. More than one may be shown.
- (4) Lower left—description of target.

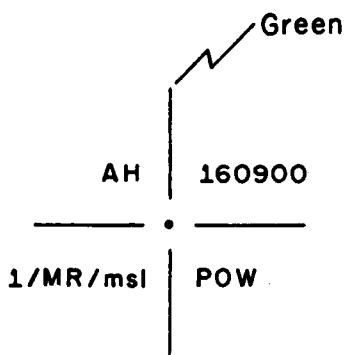
g. Changes in Target Status. The plots of targets are changed



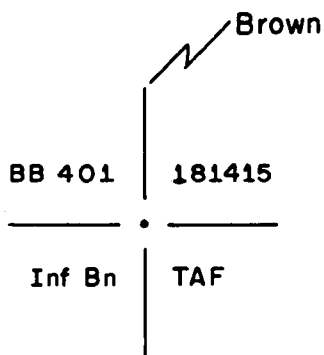
Suspect cannon location



Confirmed mortar location



Suspect battery location



Location of target other than artillery or mortar

Note. Colors reflect accuracy of location.

Figure 11. Target plots.

to conform to the target's known status. For example, the color of the basic symbol may be changed to reflect the report of a more accurate location or the plot may be removed from the suspect location overlay and replotted on the hostile battery (mortar) chart when the location is confirmed (*d* above). When a target location is reliably reported to be vacated, its plot is removed from the general target overlay or the hostile battery (mortar) chart and, in the case of artillery (mortars), the plot is re-entered on the suspect location overlay. Regardless of the type target location now reported to be vacant, the target file card is retained in the suspect section of the appropriate file for reference if the location is reoccupied and to facilitate post strike analysis (par. 170).

191. Shelling Reports

a. Shelling reports are plotted (fig. 12), as received, on the shelrep overlay.

- (1) The basic symbol is a ray whose origin is at the observer's reported location. However, if the shelling report is based on measurements taken at the crater or furrow, the area shelled ((3) below) is the origin of the ray. In the case of "flash-bang" reports (par. 206), the rays are drawn with tick marks which correspond to the ranges determined from reported time intervals.
- (2) To permit rejection of false intersections, the rays are usually drawn according to a color code. For example:
 - Red — Heavy weapons (caliber or size).
 - Blue — Medium weapons (caliber or size).
 - Green — Light weapons (caliber or size).
 - Brown—Missiles (size or short, medium, or long-range).
 - Black — Unknown.

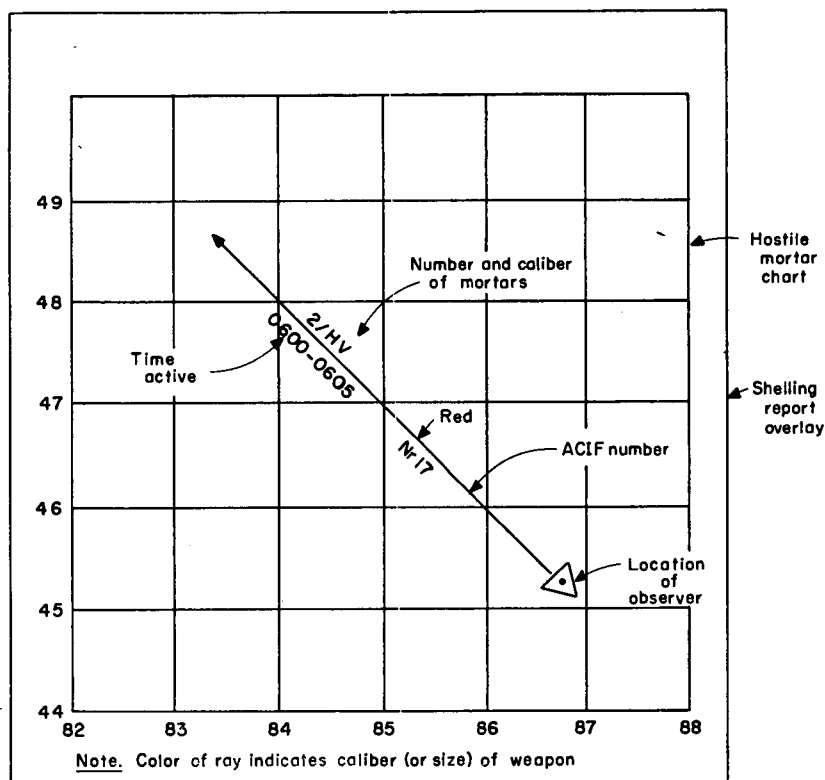


Figure 12. Shelling report plot of information from artillery counterfire information form.

- (3) When the area shelled is reported, it may also be shown on the shelling report overlay. Notations concerning the number and caliber (or size) of the shells fired, the nature of the fire, and the time fired, are desirable.
- (4) Notations are placed on the ray to identify the shelrep. Notations normally include the time of firing; the ACIF number; information concerning the number, caliber (or size), and type of weapons; and the flash-bang distance if reported in item J, ACIF.

b. Shelreps are evaluated on receipt as to accuracy and reliability (pars. 203–205). When the shelrep is plotted on the shelrep overlay it is considered in conjunction with the hostile battery chart, attached overlays, and any other pertinent information available. If the shelrep establishes the activity of a hostile location an entry is made on the appropriate target file card. If the information concerns hostile mortar activity, the information is entered in the appropriate quadrant of the plot on either the hostile mortar chart or the suspect location (mortar) overlay. If the information concerns hostile battery activity, the information is entered in the appropriate quadrant of the plot on either the hostile battery chart or the suspect location (battery) overlay and the counterbattery intelligence map. When appropriate, the information is passed to the S3 for information and necessary action. When the azimuth or location is unrelated to any plotted location, a careful study is made taking into account weapon type and caliber (or size) to determine likely tactical positions. Intelligence agencies may be directed to seek further information in these areas.

Section III. COUNTERBATTERY ACTIVITIES

192. General

a. Counterbattery intelligence has as its objective the gathering of complete information pertaining to hostile batteries. In this respect, counterbattery intelligence does not differ from other phases of military intelligence. Its immediate operational objective is attained when the counterfire agencies are provided with sufficient information, to properly engage the hostile artillery location with effective counterbattery fires.

b. Counterbattery intelligence serves a broader function when its product is integrated into the whole of the intelligence effort. Important tactical deductions, independent of the operation of attacking hostile batteries, may be derived from positive knowledge of the enemy artillery strength and dispositions.

c. Successful counterbattery intelligence depends on the coordinated employment of contributing intelligence agencies and on the systematic recording and evaluation of assembled data.

193. Counterbattery Activities

a. *Responsibility and Organization.*

- (1) The army artillery commander is responsible for counterbattery activities against enemy long-range missile units beyond the range of weapons and target acquisition agencies allotted to corps. The intelligence agencies capable of performing this mission are tactical air reconnaissance, US Army Security Agency units under field army control, and clandestine means.
- (2) The corps artillery commander is responsible for all counterbattery activities within the range of the weapons and target acquisition agencies allotted to corps. He has the staff and communication facilities to perform this mission.
- (3) When distances prohibit effective control of counterbattery activities by corps artillery, decentralization of this function, in whole or in part, may be made to a field artillery group(s). Personnel from corps artillery may be attached to augment the group capability in the discharge of this responsibility.
- (4) When the operations of a division require the division artillery to assume the responsibility for counterbattery activities, necessary counterbattery means must be attached to the division.
- (5) The S2 of corps artillery is responsible for supervising the collection and recording of all possible information of enemy artillery, air defense artillery, and antitank guns. From this information, the S2 selects remunerative targets and transmits to the S3 a detailed description of each target so that the S3 can readily decide how the target is to be attacked.

b. *Counterbattery Policy.* In every situation it is necessary for the commander responsible for counterbattery operations to enunciate a counterbattery policy. This policy will be the commander's concept of the employment of his artillery in the counterbattery role. The policy is continually scrutinized and revised as necessary in accordance with the changing situation. The complexity of the considerations involved in determining a counterbattery policy requires detailed staff coordination.

- (1) *Definition.* A counterbattery policy is an expression by

the corps artillery commander of his plan of employment of the artillery to attack hostile artillery in support of the force commander's mission and plan of maneuver or scheme of defense. It may include the type of counterbattery program to be executed, standard methods of attack of specific targets, and the artillery commander's concept of his counterbattery criteria as to what should constitute a suspect battery location and a confirmed battery location for the specific tactical situation. (For further explanation of counterbattery (countermortar) criteria, see par. 197c.)

- (2) Types of counterbattery policy. There are three types of counterbattery policy. These are—
 - (a) An *active* policy which is the delivery of counterbattery fires on all hostile battery locations as soon as they are located.
 - (b) A *silent* policy which is the withholding of counterbattery fires to provide time for all available means to collect counterbattery intelligence information so that a more effective counterbattery program can be prepared.
 - (c) A *semiactive* policy which is a compromise between the active and silent policy. For example, such a policy may be silent except for the delivery of counterbattery fires on those hostile locations whose fires are causing damage to friendly elements. Some artillery units may also be required to follow an active policy while others of corps artillery follow a silent policy in order not to disclose the presence of new units or the loss of artillery units in the force.
- (3) Some of the considerations affecting the determination of the counterbattery policy are—
 - (a) The mission of the supported force.
 - (b) A knowledge of the tactics and technique of employment of the enemy's artillery and other heavy weapons.
 - (c) The amount and types of artillery in the enemy force and the degree to which it is active.
 - (d) A knowledge of the enemy's capability for reinforcing his artillery.
 - (e) An estimation of our capability to locate enemy artillery position.
 - (f) An estimation of our ability to deliver effective fire on enemy artillery locations by appropriate means.

- (g) A knowledge of the strength, status, and morale of enemy artillery units.
 - (h) A knowledge of the intensity or type of fire required to achieve the effect desired upon the enemy artillery locations.
 - (i) A knowledge of the enemy capability of locating our artillery and delivering effective fire on our battery positions.
 - (j) Employment of deception techniques to reduce the enemy's capability for locating our artillery positions.
 - (k) A knowledge of the communication systems employed by enemy artillery commanders and the location of enemy communication installations.
 - (l) Ammunition available to support the counterbattery policy.
- (4) Selection of a counterbattery policy. The establishment and application of the counterbattery policy must guard against the creation of a standard pattern of friendly artillery fires which will reveal the plan of action to the enemy. Merely the fact that a counterbattery policy worked "yesterday" in a similar tactical situation is no assurance that the same policy will be applicable "today." A thorough analysis of each situation in the light of the considerations discussed in (3) above may result in the establishment of a successful counterbattery policy. When a semiactive counterbattery policy is selected, the artillery commander should announce his policy in detail in order that subordinate artillery commanders and his staff are fully cognizant of the particulars of such a policy.

c. Execution of Counterbattery Fires. Hostile batteries should be attacked with surprise fire. Time and ammunition permitting, batteries once neutralized should be destroyed by fire. The observation battalion can often determine the accuracy of unobserved fires by sound, flash, or radar.

d. Evaluation of Counterbattery Fires. During the course of operations, a continuous evaluation of the effect of counterbattery fires on hostile artillery should be made (par. 170).

194. Functions

Within the corps artillery headquarters, the counterbattery function is divided between the S2 and S3 sections.

a. The S2 and his assistants are responsible for producing counterbattery intelligence. Counterbattery intelligence includes the location and identification of hostile batteries, the study of tactics

and techniques of hostile artillery employment, and the determination of enemy artillery capabilities and limitations.

b. The S3 and his assistants are responsible for the delivery of effective neutralization or destruction of counterbattery fires on the hostile battery location provided by the S2 and his assistants.

c. Counterbattery intelligence has a scope which carries it beyond the field of counterbattery activities. Knowledge of hostile artillery dispositions and strength has an important bearing on tactical decisions affecting the whole force.

195. Agencies Contributing Counterbattery Information

a. There are numerous information agencies directly or indirectly available to the corps artillery assistant S2, counterbattery intelligence officer (CBIO). The skillful CBIO must coordinate the activities of these agencies so as to exploit their points of strength and minimize their points of weakness.

b. The following agencies are normally available to the CBIO (ch. 9).

- (1) Field artillery observation battalion.
- (2) Corps artillery aviation battery and other army aviation.
- (3) Photo interpreters.
- (4) Unit shelling reports and shell crater analysis.
- (5) Ground observation posts.
- (6) Interrogators of prisoners of war and civilians.
- (7) Tactical air and reconnaissance aviation.
- (8) Communication reconnaissance units.
- (9) Higher, lower, and adjacent units.

196. Specific Duties of the CBIO

The CBIO assists responsible members of the corps artillery staff by furnishing counterbattery information as required to develop a counterbattery program in the conduct of deliberate operations, to develop an estimate of the hostile artillery situation for the force commander and higher headquarters, and to facilitate an intelligent discrimination in the selection of counterbattery targets of opportunity. In addition, he—

- a.* Coordinates the activities of contributing counterbattery intelligence agencies.
- b.* Collects counterbattery information.
- c.* Evaluates and interprets counterbattery information received.
- d.* Records counterbattery information.

- e. Disseminates counterbattery information.
- f. Instructs and familiarizes personnel with the corps in their counterbattery responsibilities.
- g. Provides for post strike analysis.

Section IV. COUNTERMORTAR ACTIVITIES

197. General

a. Countermortar intelligence has as its objective the reduction of uncertainties related to the location of hostile mortars. Its immediate operational objective is attained when the counterfire agencies are provided with the information necessary for successful attack of known hostile mortars.

b. The most difficult countermortar problem is locating the position, or even the area, from which these weapons are firing. Because mortars possess the capability of displacing frequently and quickly, speed in the handling of countermortar information is essential. Countermortar activities are speeded up by decentralization to facilitate rapid communication between the sources of information and the means for neutralization of hostile mortars; and by maintenance of the minimum number of records, charts, and forms required to provide a clear, concise record of enemy mortars.

c. Due to the characteristics and nature of employment, an active hostile mortar should be engaged as soon as it has been located with sufficient accuracy and adequate target description to insure delivery of effective counterfire. In this respect the division commander will usually follow an active policy, i.e., hostile mortars will be attacked with appropriate fire as soon as located. Before the assistant S2, (countermortar intelligence officer) (CMIO) can correctly utilize countermortar information, he should receive guidance from his commander for the development of the countermortar situation. This guidance from the commander is usually given to him in the form of certain criteria which define a suspect hostile mortar location and the information necessary to confirm a suspect location. The definitions of a suspect and confirmed mortar location (par. 188) are purposely general in nature and should be modified by the commander to fit the tactical situation. The countermortar criteria are usually based on the recommendations of the CMIO. Some of the factors that the CMIO should consider in determining these criteria are as follows:

- (1) Mission of the supported unit.
- (2) Hostile mortar activity.
- (3) Counterfire ammunition available.

- (4) Effectiveness of countermortar intelligence.
- (5) Enemy tactics and techniques of employment of mortars.
- (6) Enemy use of dummy and simulated positions.

d. Countermortar criteria can be changed frequently. Such criteria should not appear in division artillery standing operating procedures (SOP's) ; however, the commander's concept of the conduct of countermortar operations and general definitions concerning countermortar activities *are* appropriate data for SOP's.

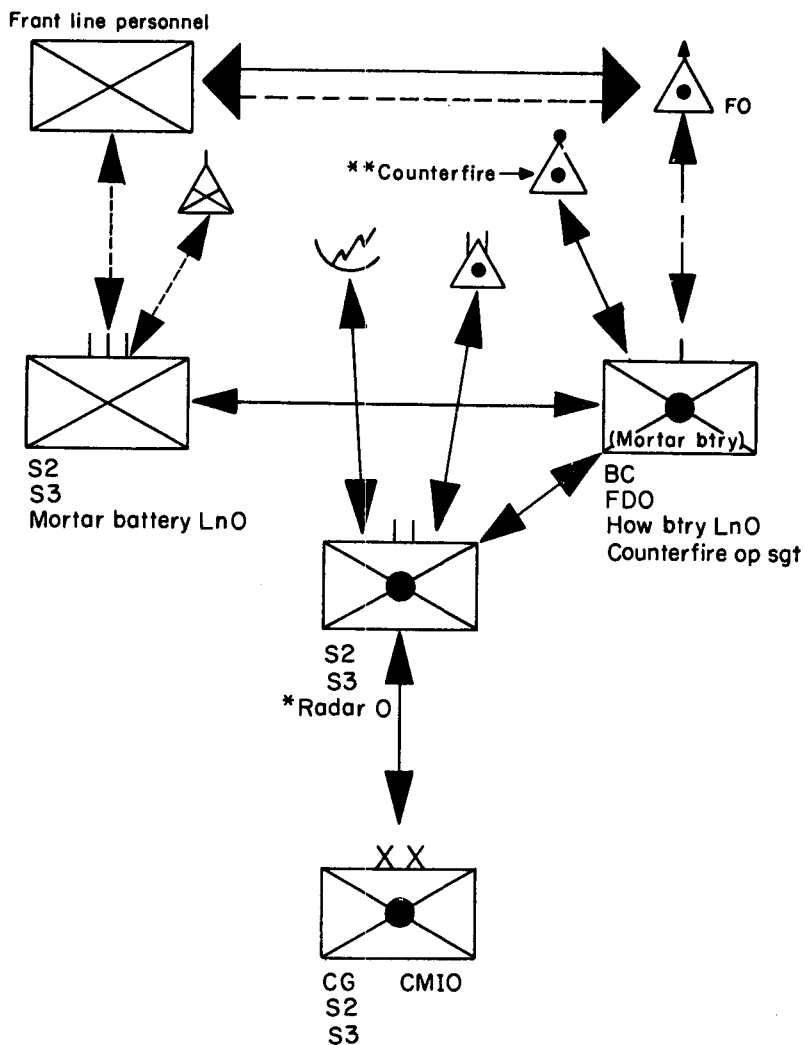
198. Division Organization for Countermortar Operations (fig. 13)

Success in countering the activities of hostile mortars is dependent on the efficiency with which countermortar activities are organized. A good organization for countermortar activities provides for the exploitation of all possible sources of countermortar information, fast and efficient processing of this information, and rapid dissemination of pertinent information to appropriate personnel and units. Close cooperation between the supported infantry units, the battle group artillery, and division artillery is required. In the armored division the same close cooperation is required of armored infantry and armor battalions, combat commands, direct support artillery battalions, and the division artillery headquarters.

a. The coordination of the division's countermortar activities is the responsibility of the division artillery commander. In the discharge of this responsibility he is assisted by—

- (1) The division artillery S2 who is concerned with all intelligence.
- (2) An assistant S2, countermortar intelligence officer (CMIO) (fig. 2). Under the supervision of the S2, he collects, processes, and disseminates all obtainable information and intelligence concerning hostile mortars. He advises the division artillery commander concerning the general employment of the radar sections of the division artillery and assists the division artillery S2 in the assignment and coordination of their sectors of search.
- (3) The division artillery S3 who utilizes the division artillery and reinforcing weapons for the most effective attack of hostile mortars.

b. The two countermortar radar sections of the infantry division are organic to the division artillery headquarters battery. These sections are kept under the operational control of the division artillery S2, and their location and sectors of scan are controlled by the CMIO. Each radar section is usually emplaced near an artillery



Notes.

- *Assigned to hq and hq btry div arty.
- **Organic to battle group hq and svc company, but normally attached to mortar btry.

Legend.

- Artillery channels
- Infantry channels

Figure 13. Infantry division organization for countermortar operations.

battery or location for ease in maintaining local security, to facilitate communications with the nearest counterfire unit, and to facilitate the provision of mess and administration (FM 6-21).

c. Divisional field artillery battalions are organized for countermortar activities as follows :

- (1) The S2 is charged with the location of targets, including mortars, and the recommendation of fire missions to the S3. He expedites the flow of information concerning mortars to the battle group artillery, to artillery representatives with supported or reinforced units, and to division artillery.
 - (2) The S3 executes countermortar fires according to the existing situation and availability of weapons.
 - (3) Each light field artillery battalion organic to the armored division is authorized a countermortar radar section with a primary mission of locating mortars. This section is supervised by the radar officer. He is responsible for the training, tactical and technical proficiency of personnel, and maintenance of organic equipment in the section.
- d. Countermortar activities within the battle group involve—
- (1) The division artillery commander who is responsible for overall coordination of division countermortar activities.
 - (2) The battle group S2 who has unit staff responsibility for collecting, evaluating, and disseminating counterfire information, and who exercises staff supervision of the operations of the battle group counterfire squad. Counterfire information, which includes countermortar information, is assembled by the counterfire operations sergeant who establishes and operates the counterfire center which is normally located in the battle group artillery FDC. The counterfire center is the focal point for all counterfire information originating within the battle group.
 - (3) The battle group S3 and the battle group artillery commander who coordinate infantry counterfire operations and artillery countermortar activities. The battle group counterfire squad is organized and equipped to operate short range, sound locating instruments for the purpose of locating enemy weapons. The squad is normally attached to the mortar battery in combat.
 - (4) The battle group artillery fire direction officer (FDO) who obtains information from artillery sources and from the counterfire operations sergeant; utilizes the battle group artillery and reinforcing weapons for the most effective attack of hostile mortars located by battle group means; and provides division artillery with available countermortar information. He is assisted by the battle group artillery intelligence sergeant.
 - (5) The reinforcing artillery liaison officer who assists the

battle group artillery in countermortar activities. He assists the battle group artillery in obtaining additional artillery fire and in coordinating the activities of the counterfire squad with division artillery countermortar radar.

e. Countermortar activities within the combat command, armored infantry battalion, and armor battalion involve—

- (1) The S2 who is charged with countermortar intelligence.
- (2) The S3 who supervises countermortar operations.
- (3) The field artillery liaison officer who assists in coordinating artillery and infantry fires and in disseminating information.

199. Communication

As speed is essential to countermortar action, the organization for countermortar operations must have efficient means of communication for the flow of information and for calling on the most suitable weapons for fire. In most instances, the normal communication systems will suffice, but additional facilities may become necessary for the rapid transmission of information. Artillery communication channels are normally utilized for countermortar activities.

200. Methods of Locating Mortars

Enemy mortars may be located by a variety of methods (par. 195). Included in the available methods are—

a. Sound and radar ranging and visual observation (pars. 64 and 87).

b. Mortar reports and crater analysis (pars. 202, 211, and 216–218).

c. Aerial photographs (par. 173).

d. Studies of enemy-held terrain for probable target locations (target prediction).

- (1) A study of enemy terrain may be made from available sources, such as maps, aerial photographs, and air and ground reconnaissance. This and allied information, together with a knowledge of the enemy's organization and tactical doctrine for mortars, will enable countermortar personnel to make a reasonable deduction of hostile mortar locations.

- (2) A continuous comparison should be made between the number of hostile mortars located and the estimated number on the front to estimate progress being made. An esti-

mate of the number of opposing mortars may be derived from experience, order of battle information, and knowledge of the enemy's situation.

- (3) After enemy territory has been overrun, a study of hostile mortar locations should be made. This will assist in future countermortar work by revealing the—
 - (a) Average number of mortars in a unit.
 - (b) Use of alternate and dummy positions.
 - (c) Typical location and organization of mortar positions.
 - (d) Accuracy of countermortar fires.
 - (e) Efficiency of the countermortar intelligence system.

201. Countermortar Operations

The organization for countermortar activity is decentralized in order to obtain the maximum speed in dealing with enemy mortars that are located. The exchange of information between artillery and infantry is conducted through the artillery representatives at the infantry headquarters.

a. Countermortar information originating in the armored infantry battalion is plotted and interpreted immediately upon receipt by the battalion S2. When such information indicates a probable hostile mortar position, fires by the most effective available weapons are requested without delay. Regardless of the action taken by the battalion S2, the information should be forwarded to the division artillery CMIO by the most expeditious means.

b. Battle group artillery and direct support artillery countermortar operations are the same as for any other type target discovered by the artillery except for the priority given countermortar messages, the emphasis placed on the exchange of countermortar information with the infantry, and the immediate passing of complete information to division artillery.

c. By selecting those hostile mortar locations which have been most recently active and are within the zone of the supported unit or have the capability of firing within the zone, the CMIO should be able to provide the division artillery S3 with a sufficient number of locations for a suitable countermortar program. The following factors will influence the effectiveness of countermortar programs.

(1) *Favorable.*

- (a) Frequent and rapid transmission of all countermortar information from all units located in the sector of the supported unit.
- (b) Recording the time of most recent activity on locations shown on the hostile mortar chart and suspect location overlay.

- (c) Ability of the CMIO to select properly hostile mortar locations based upon his past experience and knowledge of enemy mortar tactics and techniques.
 - (d) Effectiveness of the staff coordination between the CMIO and the division artillery S3 section in exchanging timely countermortar information.
- (2) *Unfavorable.*
- (a) Indiscriminate attack of all known suspect and confirmed locations throughout the zone of the supported unit.
 - (b) Failure to attack mortar locations which are outside the supported unit zone of action but are capable of firing within the zone.
 - (c) An increase in hostile mortar activity, and a corresponding increase in the volume of countermortar information, which make the CMIO's analysis more difficult.
 - (d) Excessive expenditure of ammunition with questionable results due to inaccurate location, inadequate target description, and indiscriminate attack of locations.

Section V. SHELLING REPORTS

202. General

a. Whenever and wherever hostile cannon, missile, or mortar shelling or hostile bombing is observed, it must be reported without delay to the appropriate headquarters which can evaluate and act upon the information. This report is forwarded in accordance with the format and procedure prescribed in paragraphs 206 through 210.

b. Shelling and bombing reports form the basis of efficient counteraction to enemy fire. In addition to providing information that assists in the initial location of hostile weapons, shelling and bombing reports further aid counterbattery, countermortar, and air defense operations by—

- (1) Indicating *when* enemy weapons are firing.
- (2) Indicating *which* weapons or planes are active.
- (3) Indicating *number, caliber (or size), and type* of active weapons.
- (4) Reporting *effectiveness* and indicating *purpose* of enemy fire.
- (5) Aiding in defining enemy fire *capabilities*.
- (6) Furnishing information which permits efficient application of additional and confirming means of target location.

203. Reporting Types of Shells

a. Shells or fragments not positively identified should be reported immediately to proper authorities. For technique of fragment analysis, see TM 30-240.

b. To be of maximum value, fragments should be tagged with the following information:

- (1) Date and time shell landed, if known.
- (2) Location where shell was found, as accurately as possible.
- (3) Direction from which shell came and method used in determining that direction (survey of crater, sound, etc.).
- (4) Name and organization of person making report.
- (5) Reference to shelling report on which this shell was reported, if known.

204. Specific Values of Reports

a. *Artillery Shelling (SHELREP) and Mortar Shelling (MORTREP) Reports.* Shelling reports furnish valuable information of the disposition and activities of the hostile weapons. By a detailed analysis of shelling reports, the artillery intelligence officer obtains information that may permit the location of hostile weapons and permit effective employment of counterfire.

b. *Bombing Report (BOMBREP).* Bombing reports provide valuable information to the intelligence sections of higher headquarters, both air and ground. They are used in preparation of enemy air order of battle studies. Through proper processing and analysis, they give indications of enemy air capabilities and intent as well as new developments, tactics, and doctrine.

205. Detail and Accuracy

The most reliable, accurate, and informative reports of hostile shelling or bombing are based on visual or electronic observation supplemented by crater analysis and fragment identification. Reports (SHELREP, MORTREP, BOMBREP) should be as detailed and accurate as the necessity for speed will permit. *No individual should neglect or delay a report due to lack of complete information.* Fragmentary or incomplete information is often of value in supplementing or confirming existing information. All personnel, regardless of arm or service, must be made aware of the necessity for promptly reporting shelling or bombing information that comes to their attention. However, the greatest volume of usable reports is submitted by specially trained personnel. Provision should be made for training of such specialists within units of company size and larger.

206. Content of Shelling Report

Items to be covered in the shelling and bombing report are transmitted in the following sequence:

a. Item A. From. This identifies the source of the report. The current call sign or code name is used.

b. Item B. Position of Observer. A map reference is preferred; however, such a reference must be encoded by the use of a grid reference code, map template, thrust line, or some other security means. The location of the observer is essential for plotting the azimuth reported in item C.

c. Item C. Grid or Magnetic Bearing Azimuth of Flash, Sound, Origin of Flight Path, or Groove of Shell in Mils or Degrees. The observer must state whether he is reporting a grid or magnetic direction, how he determined the direction (whether from seeing the flash, hearing the sound, observing the flight path, or sighting along the shell's furrow), and the units of measure (mils or degrees) he has used. The direction is measured from the observer to the enemy weapon. This item is omitted from bombreps. The azimuth to the suspected hostile area can be determined—

(1) *By sound.* Estimation of direction by ear is the most common and the most inaccurate method used. It should be confirmed by other methods whenever possible. Hearing the gun fire and measuring the azimuth to the area from which the sound seemed to come or hearing the passage of a shell and measuring the azimuth of its apparent course are the two methods most often used.

(2) *By seeing the flash.* This method is very accurate. However, since flash simulators may be used, the location obtained must be confirmed by other methods wherever possible.

(3) *By observing the flight path.* In many cases, the location of a missile launcher can be determined by observing the flight path to burnout, and then measuring the azimuth to the origin of the path.

(4) *By crater and furrow analysis* (pars. 211–218).

d. Items D and E. Time from (D) and Time to (E). The time that the shelling or bombing commenced and ended should be given accurately. It may be that the weapon's location can be confirmed by sound or flash locations which were taken at the same time or that reports of two or more observers may be combined. The report is not delayed until the shelling or bombing ceases. A fragmentary report is submitted immediately, followed by a complete report when obtained.

e. *Item F. Area Shelled or Bombed.* The area shelled or bombed is preferably identified *in the clear* by map reference. The precision with which targets are attacked by the enemy may indicate the enemy's employment of forward observers, photographs, map data, or sound, flash, and radar units. The intensity or the persistency of shelling or bombing may indicate the value of the target to the enemy, the status of his ammunition supply, and whether the fire is for defensive operations or preparation for an attack.

f. *Item G. Number, Caliber (or Size), Type of Guns, Mortars, Missiles, or Aircraft.* The number of guns or mortars is estimated by the time between individual bursts or by the number of bursts that occur within a relatively few seconds. Consideration is given to the caliber of shell and the consequent time needed for reloading. Fragment identification is a method of determining caliber and sometimes type of shells. Initially, the caliber may be estimated as light, medium, or heavy. Difficulty in determining the number, size, and type of missiles will vary with the missile and the type of warhead. However, the slow rate of fire and other characteristics of missiles should make identification relatively simple in many cases.

g. *Item H. Nature of Fire (Omitted for BOMBREP).* The nature of fire may generally be classified as registration, destruction, interdiction, harassing, neutralization, or fire against a specific installation. Often the nature of fire indicates the necessity for speed in executing counterbattery fire.

h. *Item I. Number and Type of Shells, Bomb, etc.* This includes information regarding the kind of shell (nuclear, high explosive, time, incendiary, gas, etc.) or bomb (nuclear, fragmentation, cluster, incendiary, napalm, etc.) employed.

i. *Item J. Time of Flash to Bang (Omitted in BOMBREP).* One means of establishing the distance from the observer to the gun is by noting the number of seconds between the time the gun flash is seen and the sound of the discharge of the gun is heard by the observer. For practical purposes in computing the approximate distance between the gun and the observer, it is assumed that flashes are seen instantaneously and that the speed of sound is approximately 370 yards (340 meters) per second. The calculation of this distance which is based on the speed of sound has nothing to do with the time of flight of the projectile itself.

j. *Item K. Damage.* This states the damage inflicted, thereby providing information which might indicate needed changes in prescribed procedure or action. Clear or encoded transmission will depend on the situation at the time. In some cases, it may be desirable to report damage separately by flash message.

207. General Instructions

a. Because speed is essential to counteraction, the observer transmits information on shellings and bombing by the most rapid means available. The items and sequence prescribed in paragraph 206 will be used for all reports.

b. Each report will be preceded by the appropriate code word.

(1) SHELREP (in the case of enemy artillery fire).

(2) MORTREP (in the case of enemy mortar fire).

(3) BOMBREP (in the case of enemy air attack).

c. For ease and speed in transmission, each item of the report will be identified by a capital letter, e.g., A, B, C. The item title (number and type of shells, bombs, etc.) will not be transmitted.

d. The message will always be transmitted in the clear except for—

(1) Item A (par. 206), the unit. The current call sign or code name is used instead.

(2) Item B (par. 206), the location of the observer. When a map reference such as a grid reference is used, it must be encoded.

(3) Item K (par. 206), the damage. For discussion, see par. 206j.

208. Reproduction in Field Message Books

A list of the essential items of information (par. 206) and the order in which they are to be reported may be made available by printing the list on a piece of gummed paper and pasting it on the inside of the field message book.

209. Artillery Counterfire Information Form

If a shelling report is to be combined with information concerning located hostile weapons and a record of counterfire, the Artillery Counterfire Information Form (DA Form 2185-R) (figs. 14 and 15) may be used. This form may be reproduced locally on 10½ x 8-inch paper. On this form, section I is the shelling report (par. 206); section II pertains to locations of hostile batteries; and section III gives data on the action taken by the S3 (FDO).

a. *Section II, Location of Hostile Weapon.*

(1) *Item L, from and time.* The designation of the sending agency and time of message are entered in this item.

(2) *Item M, grid reference and accuracy.* The grid reference of the hostile weapon and the estimated accuracy of location are entered in this item.

ARTILLERY COUNTERFIRE INFORMATION FORM (FM 6-20)										
RECEIVED BY (Initials of writer) A. U. S.				FROM La OI				TIME 1300	NO. 7	
SECTION I SHELREP - MORTREP - BOMREP (Designate which)										
A	B	C	D	E	F	G	H	I	J	K
FROM	POS OF OBSR	MAG OR GRID AZIMUTH OF SOUND, FLASH FURROW, OR FLK PATH ORIGIN	TIME FROM	TIME TO	AREA SHELLED	NUMBER, CALIBER (or size), AND TYPE OF WEAPON	NATURE OF FIRE	NO. AND TYPE SHELLS BOMBS, ETC.	TIME OF FLASH TO BANG	DAMAGE (remarks)
OP#1	365487	1438 M	1250	1255	?	2/1/?	?	18/?	8secs	?
SECTION II LOCATION OF HOSTILE WEAPON						SECTION III COUNTERFIRE ACTION				
L	M	N	O	P	Q	FILL IN				
FROM AND TIME	GRID REFERENCE AND ACCURACY	MEANS OF LOCATING	TIME ACTIVE	NUMBER, CALIBER (or size), AND TYPE OF WEAPON	REMARKS	TIME C/FIRE	FIRE BY	NO. OF RD FUZE AND PROJECTILE	REMARKS (effect)	

DA Form 2185-R, 1 NOV 58

Figure 14. Artillery counterfire information form (may be reproduced locally) showing SHELREP recorded.

ARTILLERY COUNTERFIRE INFORMATION FORM (FM 6-20)										
RECEIVED BY (Initials of writer) R. J. W.				FROM S2, 1st Bn, 16th Arty				TIME 1258	NO. 1	
SECTION I SHELREP - MORTREP - BOMREP (Designate which)										
A	B	C	D	E	F	G	H	I	J	K
FROM	POS OF OBSR	MAG OR GRID AZIMUTH OF SOUND, FLASH FURROW, OR FLK PATH ORIGIN	TIME FROM	TIME TO	AREA SHELLED	NUMBER, CALIBER (or size), AND TYPE OF WEAPON	NATURE OF FIRE	NO. AND TYPE SHELLS BOMBS, ETC.	TIME OF FLASH TO BANG	DAMAGE (remarks)
SECTION II LOCATION OF HOSTILE WEAPON						SECTION III COUNTERFIRE ACTION				
L	M	N	O	P	Q	FILL IN				
FROM AND TIME	GRID REFERENCE AND ACCURACY	MEANS OF LOCATING	TIME ACTIVE	NUMBER, CALIBER (or size), AND TYPE OF WEAPON	REMARKS	TIME C/FIRE	FIRE BY	NO. OF RD FUZE AND PROJECTILE	REMARKS (effect)	
1st FA Bn 16th Arty Radar 1257	498675 100 meters	Radar	1255	1/2/?	Area Shelled 490650	1300	1st FA Bn 16th Arty	36 Fz 50% FQ 50% VT	Under surveillance op#1	

DA Form 2185-R, 1 NOV 58

Figure 15. Artillery counterfire information form (may be reproduced locally) showing location of a hostile weapon and action taken.

- (3) *Item N, means of locating.* The source of the information such as sound, flash, radar, air, or OP is entered in this item.
- (4) *Item O, time active.* The time the hostile weapon was active, including the date if not current, is contained in this item.
- (5) *Item P, number, caliber (or size), and type of weapon.* This item contains the number of weapons located, caliber (or size), and type (guns, howitzers, mortars, or missile).
- (6) *Item Q, remarks.* Any additional information of pertinent nature, such as observation or determination of construction of emplacements, location of truck park, activity, or the effects of fire is entered in item Q. Radar ranging reports will normally include the coordinates of the impact area.

b. Section III, Counterfire Action. This section is completed by the S3 (FDO) after counterfire has been directed against the hostile weapon's location. This section includes the time of counterfire, the unit firing, the number of rounds fired (including the fuze and projectile used), and remarks concerning the effect of the fire.

210. Transmission

All item headings should be included to prevent repetitions of transmissions to determine whether they are purposely omitted or overlooked.

a. The shelling report shown in figure 14 may be transmitted as follows:

SHELREP	
ALFA	OSCAR PAPA 1
BRAVO	365478
CHARLIE	GRID AZIMUTH FLASH 1438 MILS
DELTA	1250
ECHO	1255
FOXTROT	UNKNOWN
GOLF	2 UNKNOWN
HOTEL	UNKNOWN
INDIA	18 UNKNOWN
JULIETT	8 SECONDS
KILO	UNKNOWN

b. The radar location shown in figure 15 may be transmitted as follows:

LIMA	1ST HOW BN, 16TH ARTY, RADAR 1257
MIKE	478675 100 METERS
NOVEMBER	RADAR
OSCAR	1255
PAPA	1 UNKNOWN
QUEBEC	AREA SHELLLED 490650

Section VI. LOCATION OF HOSTILE GUNS AND HOWITZERS BY CRATER ANALYSIS

211. Gun and Howitzer Shell Crater Analysis

a. The direction of flight of a projectile can be determined with reasonable accuracy from its crater or ricochet furrow. By locating the crater accurately and measuring the direction of flight of the projectile, the azimuth of a ray that will pass through or near the actual artillery position can be obtained. The position area of a battery may be located by plotting the intersection of the average back azimuths from two or more widely separated groups of craters from shells determined to have been fired by the same battery. It is possible to determine the direction to a battery with fair accuracy from the back azimuth obtained from one crater or ricochet furrow.

b. In crater analysis, the differences in slopes of fall, burst patterns of the projectiles, directions of flight, and settings of time fuzes will all aid in distinguishing between hostile artillery units firing on a given area.

212. Value of Analysis

By analyzing of shell craters, it is possible to—

a. Verify, as confirmed locations, suspected locations that have been obtained by other means.

b. Detect the presence and approximate location of enemy batteries not previously suspected.

c. Obtain an early indication of the general location or direction of active enemy artillery.

d. Assist in accomplishing counterbattery intelligence missions.

e. Detect the presence of new types of enemy weapons, new calibers (sizes), or new methods of manufacture of ammunition.

213. Inspection of Shelled Areas

Inspection of shelled areas should be made as soon as possible after the shelling. Reverse slopes, folds in the terrain, hedgerows, and buildings in shelled areas offer opportunities for finding ricochet furrows and other markings.

214. Survey for Crater Location

The area must be located with sufficient accuracy for plotting on the appropriate chart, map, or aerial photograph. Deliberate survey methods are not essential; inspection, or inspection and short traverse, using the aiming circle for direction and pacing for distance, is sufficient.

215. Determination of Direction

a. *Pattern.* A clear pattern produced on the ground by the detonating shell gives an indication of the general direction from which the shell came.

b. *Factors Affecting Pattern.*

- (1) It must be kept in mind that due to irregularities of terrain and soil conditions, the typical shell crater pattern is the exception, not the rule. The principal parts of the pattern caused by fragmentation are the marks from side spray. There is much less effect from nose spray. Base spray is negligible with projectiles of guns and howitzers but appreciable in the case of mortars. The width, angle, and density of the side spray pattern varies with different types of projectiles, the angle of impact, and the projectile's terminal velocity.
- (2) In determining direction, consideration must be given to the effect of stones, vegetation, stumps, roots, variations in density and type of soil, and the slope of the terrain at the point of impact. Out of any group, only those craters most clearly defined and most typical should be utilized.

c. *Marks on Vegetation and Other Subjects.* The direction from which a round was fired often is indicated by marks left as it passes through trees, snow, and walls. However, the possibility of deflection of the shell upon its first impact with such objects should be kept in mind, and evidence of such deflection should not be overlooked.

d. *Drift and Wind Effects.* Drift and lateral wind effect do not materially change the direction of the shell's axis during flight, as the rapidly rotating shell is a type of gyroscope. Usually the ricochet furrow, or other path, will be parallel to the plane of fire except when obviously deflected in azimuth.

e. *Ricochet Furrows.*

- (1) Ricochet furrows usually furnish the best information. The average direction of a few good furrows *from the same battery* will give a line that passes fairly close to the battery position. Great care must be taken to determine that the shell was not deflected before or while making this furrow. *At the point where a ricochet changes from a descending to an ascending path, it will often change direction of flight.*
- (2) Carefully remove loose dirt from the furrow by hands, leaving the smooth, hard channel intact. Drive a stake

or survey pin at each end of the usable straight part of the furrow. Set the stakes straight and just touching the center line of the channel on the same side. These stakes represent the line of fire, the azimuth of which may be measured with an aiming circle (fig. 16).

f. Fuze-Quick Craters.

- (1) At small angles of fall, fuze-quick craters furnish information nearly as accurate as that from ricochet furrows. Judging the direction of the trajectory increases in difficulty with an increase in angle of impact; therefore, more craters must be analyzed. If the angle of impact is small or moderate, the crater generally is pear-shaped. If the angle of impact is larger, the crater generally is oval with the least diameter in the direction of flight.
- (2) Direction of flight can be found by—
 - (a) Groove in ground where shell entered (fig. 17). Place a stake in center of channel. Place a second stake on opposite side of crater. Sight along these to obtain back azimuth as with ricochet furrows. Position of fuze tunnel or groove may give a good indication of direction of fire.
 - (b) Use of side spray (hatchet stroke) shown by dirt and cut grass. Place a stake near the end of each side spray (hatchet stroke) that will divide the spray in half (fig. 18). Place the aiming circle as accurately as possible over the center of the crater and measure the angle between the stakes. The bisector of this angle is the approximate line of fire, and its back azimuth can be determined.

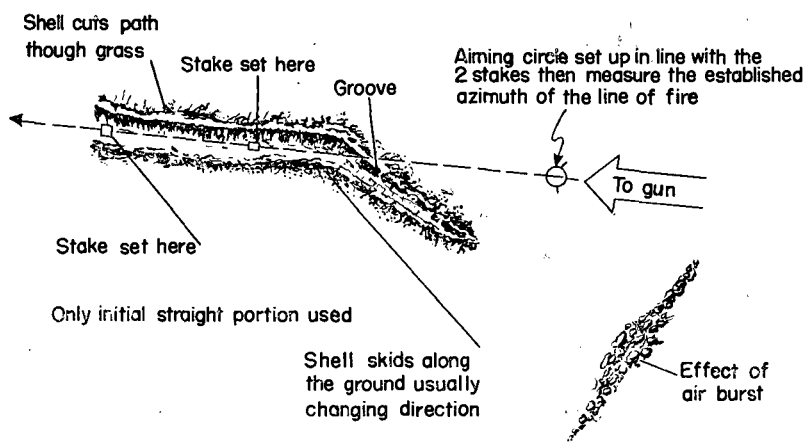


Figure 16. Typical ricochet markings.

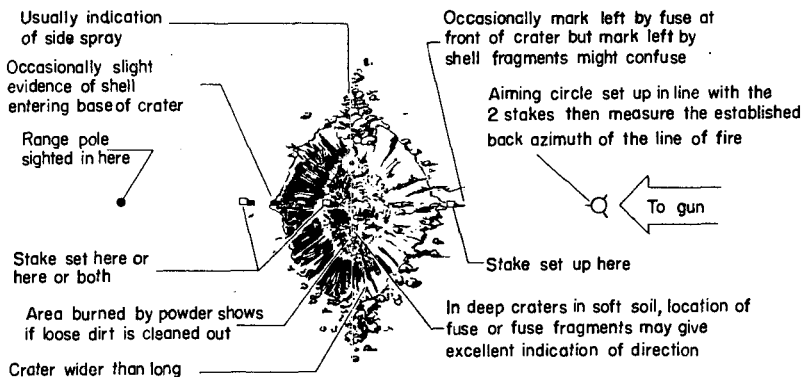


Figure 17. Schematic shell crater, fuze-quick.

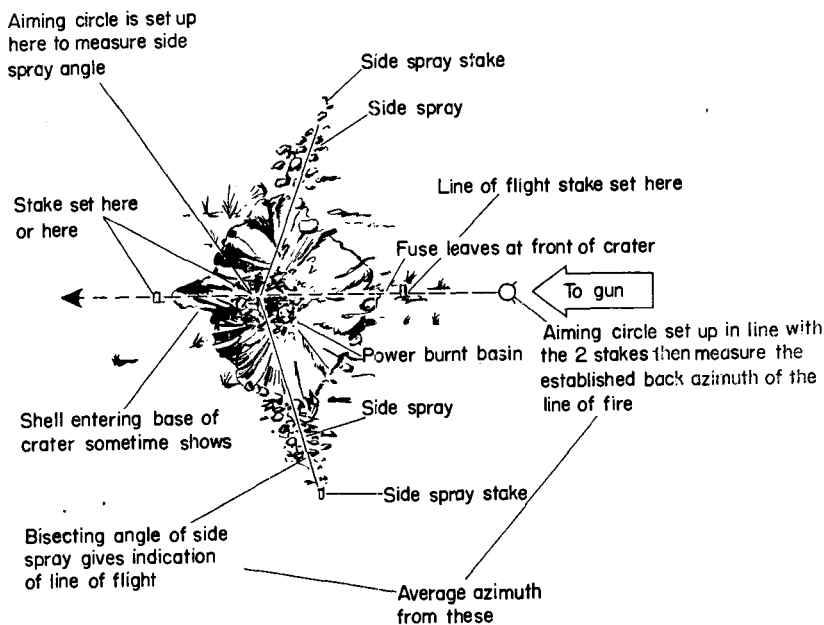


Figure 18. Determination of direction by side spray.

- (c) The average of the back azimuths obtained from (a) and (b) above, will be more dependable than from either method alone.

g. Deep Craters. Least reliable directions are derived from deep craters. However, in soft soil, good approximate direction can be obtained if a nose fuze has been employed. A nose fuze will form a tunnel in prolongation of the shell's line of flight. A line of fire can be established from this tunnel in conjunction with other characteristics. The crater pattern ordinarily will be oval with the least diameter indicating direction of fire.

Section VII. LOCATION OF HOSTILE MORTARS BY CRATER ANALYSIS

216. Mortar Shell Crater Analysis

Mortar shell crater analysis parallels that of gun and howitzer shell crater analysis. It is difficult sometimes to differentiate between the craters of light howitzer and mortar projectiles.

217. Appearance of Craters

The appearance of a typical mortar crater is characterized by the following:

a. At the front edge (one farthest from mortar position) of the crater, the turf is undercut (fig. 19) while the back edge is shorn of growth and grooved or streaked by splinters.

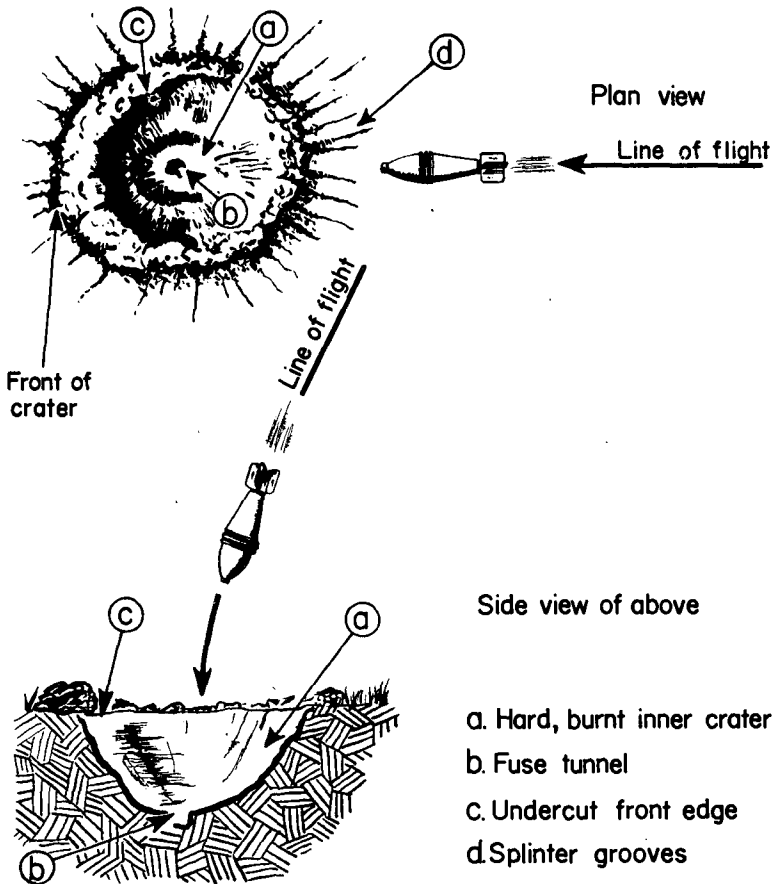


Figure 19. Schematic mortar crater.

b. When fresh, the crater is covered with loose earth which must be removed carefully to disclose the firm, burnt, inner crater (fig. 19).

c. The fuze buries itself in the bottom of the inner crater in front of the point of detonation (fig. 19). In soft ground the fuze will bury itself to a considerable depth along the line of the trajectory.

d. The ground around the crater is streaked by splinter grooves, all of which radiate from the point of detonation (fig. 19). The pattern of these grooves depends on the angle of fall and the type of soil. The ends of the splinter grooves on the rear side of the crater frequently will be on an approximately straight line. This line will be perpendicular to the line of flight when on level ground or on slopes with contours perpendicular to the plan of fire (fig. 19).

218. Determining Direction to Mortars

Three methods may be used to determine the line of flight from a mortar crater.

a. Drive a stake in the crater with the top at the intersection point of splinter grooves (fig. 20). Carefully remove loose dirt and look for fins and fuze fragments. Do not disturb the firm sides of the fuze tunnel; the latter is useful in determining direction. Lay a stick along the line from the fuze or tunnel to the stake above. Measure the azimuth of the stick. This is the approximate azimuth to the mortar.

b. Lay one stick along the ends of the splinter grooves on the side of the crater toward the hostile mortar and place another stick at right angles to the first (fig. 20). Measure azimuth of the second stick.

c. When a definite and regular crater is formed, a stick can be laid across it along the main axis, that is, dividing the crater into symmetrical halves. The stick so laid points in the direction of the mortar (fig. 20).

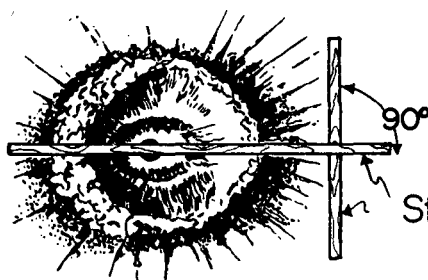
d. The value of each method described above depends upon the type and conformation of the ground. It usually will be found that direction is best determined by a combination of all methods.

e. Determination of the angle of fall (fig. 21) is a valuable aid in arriving at the range to the hostile weapon. If the fuze hole is deep and well defined, a long, straight stick should be placed in the center of the fuze tunnel to reconstruct the terminal portion of the trajectory of the projectile. With the stick properly placed in the fuze tunnel, a protractor and plumb bob may be used to measure the angle of fall. For more accurate results, the mean angle of fall from a number of craters made by the same weapon should be used.



Direction
to mortar →

① Locating point of detonation



Direction
to mortar →

Sticks

② Direction from splinter grooves



Direction
to mortar →

③ Direction from general shape

Figure 20. Determination of the line of flight from a mortar crater.

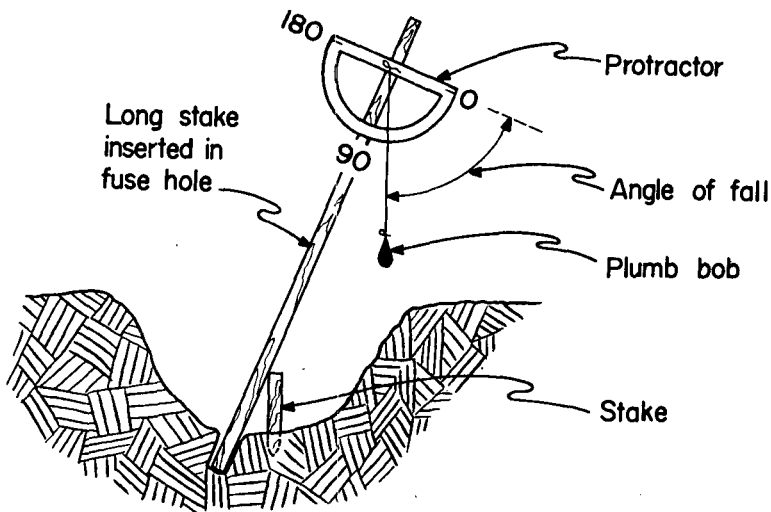


Figure 21. Determining angle of fall from a mortar crater.

f. When only one azimuth to the mortar position can be determined, the range to the position may be found from the angle of fall (*e* above) and the type and caliber of weapon are determined from identification of shell fragments and tail fins. In order to use this system, counterfire personnel must have available to them the firing table of the hostile weapons involved.

CHAPTER 11

COORDINATION OF FIRE SUPPORT

Section I. GENERAL

219. General

a. Fire support is the most flexible and one of the principal resources available to the commander for influencing the outcome of battle. The effectiveness with which he employs this resource in support of his plan of action may be decisive. The coordination of fire support is not a new procedure or technique; its basic principles have existed for many years. Although established principles for the coordination of fire support do not change with the addition of nuclear weapons, its importance is enhanced by the increased lethality of these weapons.

b. The fire support coordination center (FSCC) is the agency charged with the accomplishment of fire support coordination at corps and division. At field army, the fire support section of the tactical support coordinating agency accomplishes the coordination of fire support. Establishment of FSCC's at echelons below division is dependent on the responsibility and functions of the echelon, the tactical situation, and the desires of the commander. Normally fire support coordination functions at lower echelons are exercised informally by the personnel involved through close liaison, frequent meetings, and flexible communications.

c. This chapter establishes principles, responsibilities, and relationships, and outlines procedures for planning, coordinating, and integrating the fires of all weapons of the Army, Navy, and Air Force employed in support of ground combat operations.

d. The principles, responsibilities, relationships, and procedures outlined in this chapter are designed to insure maximum results in the employment of fire support means to support an operation.

220. Principles

a. The supported or force commander, through combat orders, policies, priorities, or individual decisions employs all fire support available to his command.

b. The fire support coordinator is the senior artillery officer at each echelon.

c. The organization and procedure for the coordination of fire support provides for the following:

- (1) Adequate control and supervision by the force or supported commander.
- (2) Concentration of fire support means upon any target or targets.
- (3) Distribution of effective fire on several targets simultaneously.
- (4) Prompt attack on targets of opportunity.
- (5) Modification of the fire support plan when necessary to meet unforeseen or changing situations.

d. Primary consideration is given to furnishing the type of fire support requested.

e. Fire missions are assigned to or requested of the agency that can deliver most effectively the required fire within the required time. When ammunition, tactical security, and coordination permit, the most economical means for delivery of fire is used.

f. Coordination must be effected rapidly and decisively in the attack of targets of opportunity. Fires on such targets usually are delivered by the most readily available effective means.

g. Fire support missions are accomplished by the lowest echelon which has the necessary means available. When appropriate means are not available, assistance is requested from higher echelons.

h. Fire support is coordinated at each echelon to the degree to which it is involved in the mission. Final action is accomplished at the lowest echelon which can effect complete coordination of the fire support mission.

i. The necessary precautions to safeguard friendly troops, aircraft, vessels, and installations from friendly fires are implemented at each echelon where fire support is coordinated.

j. A common system of target designation must be employed by all participating fire support agencies.

221. Responsibilities

a. *Supported or Force Commander.* Coordination of fire support is a command responsibility. The supported or force commander is responsible for the coordination of all available supporting fires—with each other and with the operations of his command—and makes basic decisions concerning the coordination of fire support.

b. *Fire Support Coordinator.* The senior artillery officer at each

echelon is the fire support coordinator and principal adviser to the commander on fire support matters. He is responsible to the commander for the details of fire support coordination, preparation of the fire support plan, and supervision of its execution. He establishes and supervises the operation of the fire support coordination agency.

c. Assistant Chief of Staff, G3 (S3). The G3 (S3) of the force or supported unit has general (unit) staff responsibility for the coordination of fire support.

222. Relationships

a. The fire support coordinator effects close coordination with the G3 (S3) on fire support matters and in the preparation of the fire support plan.

b. When artillery is assigned or attached to the supported unit or force, the artillery officer is both a subordinate commander and a special staff officer (par. 16). As fire support coordinator, his relationship with the force commander is that of a special staff officer.

c. When artillery is in direct support (par. 59*b*), the artillery commander is under the command of the next higher artillery commander, and his relationship with the supported commander is that of an adviser on fire support matters. He discharges the functions of fire support coordination in a manner similar to a special staff officer. The assignment of a direct support mission requires the commander to function as fire support coordinator for the supported unit. Likewise, the artillery liaison officer represents the direct support artillery commander at armored infantry and armor battalion level.

Section II. THE FIRE SUPPORT COORDINATION CENTER

223. Definition

The fire support coordination center is an operating agency of the force or supported unit commander in which the representatives of the force or supported unit and fire support agencies work together to plan and coordinate fire support. This agency provides for effective utilization of the fire support means, including the timely attack of targets and shifting of fires in accordance with the plans and needs of the force or supported unit.

224. Functions

The personnel of the fire support coordination center—

a. Continually make plans, and allocate, coordinate, and inte-

grate the several fire support means in accordance with the directives, policies, and priorities of the supported or force commander to most effectively support the plan of operations of the force or supported unit.

b. Make detailed analyses of potential nuclear targets.

c. Evaluate and coordinate the requests received for additional supporting fires.

d. Prepare and coordinate requirements for fire support; coordinate and initiate requests for and direct additional supporting fires when required.

e. Keep the force (unit) commander and staff informed of the capabilities of, and actual support rendered by, the fire support agencies.

f. Advise the force (unit) commander and staff as to the most efficient and effective employment of the available fire support.

g. Prepare the fire support plan, based on the commander's policies, plans, and priorities, and coordinate the separate fire plans in accordance with the plan of maneuver or scheme of defense.

h. Recommend and implement approved policies concerning safety measures to protect friendly troops, aircraft, vessels and installations from friendly fires.

225. Establishment

Fire support coordination functions exist and are accomplished at all combat echelons. Fire support coordination centers are established at these levels when and with the degree of organization that the functions and responsibilities of the level dictate.

226. Location

The location of the FSCC is designated by the force or supported unit commander. At division level it should habitually be located at the main command post in close proximity to the G2-G3 sections. In the selection of the command post, consideration is given to the requirement for reliable communication between the FSCC and fire support agencies. Procedures must provide for continuous operation of the FSCC during displacements.

227. Composition

The size and composition of the FSCC is determined by the commander concerned, and may vary to meet the needs of the situation. In the planning phase of an operation, the FSCC may be enlarged to expedite the handling of the mass of details involved in the planning and coordination of fire support. During the

operation the FSCC may be reduced to the minimum size required to implement the detailed plans, to effect departure from the detailed plans to meet unforeseen situations, and to engage targets of opportunity promptly. A typical FSCC may include, in addition to the fire support coordinator or his representative, the following personnel:

- a. The G3 (S3) air.
- b. The G2 (S2) air or his representative.
- c. Representatives from each fire support agency supporting the unit or force.
- d. Target intelligence personnel.
- e. Target analysis personnel.
- f. Other advisers as required (e.g., chemical officer).
- g. Supporting operations and communications personnel.

228. Communications

a. Reliable communication must be established by using existing facilities where possible, between the FSCC and—

- (1) The FSCC's at higher and lower echelons.
- (2) The force or supported unit.
- (3) The artillery (FDC).
- (4) Other fire support agencies.

b. Communication between FSCC's and from then to the supported unit or force is a command responsibility.

c. The fire support coordinator supervises the establishment of communication and the internal arrangement of communication equipment within the FSCC.

d. Each fire support agency and each staff section represented in the FSCC is furnished the necessary means of communication and operating personnel by its parent unit.

229. Duties of Personnel

Generally, the duties performed by personnel in the FSCC are the same at higher and lower echelons. The duties of personnel of a division FSCC are listed below.

a. *The Division Fire Support Coordinator—*

- (1) Is responsible for establishing the FSCC and supervising and coordinating the activities of its personnel.
- (2) Supervises the preparation of fire support plans and the planning, allocation, coordination, and execution of all supporting fires.

- (3) Reviews fire plans to insure that—
 - (a) Nuclear and nonnuclear fires are fully coordinated.
 - (b) Unnecessary duplication of fires is eliminated.
 - (c) The plans of the various fire support agencies are coordinated.
 - (d) Adequate fires are planned on targets and critical areas.
 - (e) Troop safety criteria are met.
 - (f) Maximum effective use is being made of fire support means.
 - (g) The plans can be implemented with the fire support means available to the division. If not, he coordinates with G3 to secure additional means, or affects modifications in the plans.
- (4) Is responsible for establishing division nuclear safety lines.

b. The Division Artillery Assistant Executive Officer—

- (1) Is the principal assistant to the fire support coordinator.
- (2) Performs duties as directed by the fire support coordinator.
- (3) Represents the fire support coordinator in his absence.

c. The Division Artillery Operations Representative—

- (1) Prepares the fire support plan and the nuclear fire plan; integrates fire plans and the fire support plan.
- (2) Keeps the personnel of the FSCC informed of—
 - (a) The fire capabilities of the artillery.
 - (b) The artillery fire support actually rendered.
- (3) Provides the division artillery fire direction center (FDC) with timely information concerning requirements for artillery fire support.
- (4) Assists the fire support coordinator in determining the method and priority of attack of targets.
- (5) Is responsible for maintaining of the situation map and necessary operational records.
- (6) Makes estimates as to the most effective means of attacking targets.
- (7) Is responsible for the detailed target analysis of potential nuclear targets.
- (8) Recommends nuclear safety lines.
- (9) Provides predictions of the radioactive fallout from friendly nuclear weapons.

d. The Division Artillery Intelligence Representative—

- (1) Performs functions pertaining to target intelligence.

- (2) Keeps FSCC personnel informed of the current status of appropriate targets confronting the division.
- (3) Makes estimates of the damage to targets that have been attacked.
- (4) Informs FSCC personnel of intelligence and information received from artillery sources.
- (5) Maintains appropriate target intelligence records, files, maps, and overlays.

e. The Division G3 Air—

- (1) Represents the division G3 in the FSCC.
- (2) Keeps personnel of the FSCC informed of the tactical situation; the plan of action of the division, and any contemplated changes in the plan.
- (3) Keeps the G3 informed of the situation pertaining to fire support.
- (4) Maintains close contact with G3 air and S3 air officers at higher and lower echelons on matters pertaining to tactical air support.
- (5) Coordinates requests received from subordinate units for air support.
- (6) Prepares the division daily requirement for preplanned air support in coordination with other members of the FSCC, indicating the priority of each requirement, and, after approval, forwards the statement of requirements to the corps G3 air.
- (7) Assists in the preparation of the air support and nuclear support portions of the fire support plan.
- (8) Assists in the preparation of the nuclear fire plan.
- (9) Prepares the air fire plan; assists in the coordination of the air fire plan with other fire plans; assists in the integration of the air fire plan and the fire support plan.
- (10) Forwards approved requests for immediate air support direct to the fire support coordinating agency at field army headquarters.
- (11) Coordinates air missions with other supporting fires; e.g., arranges with other members of the FSCC for flak suppression fires, target marking by artillery or naval gunfire, and suppression of friendly fires as necessary.
- (12) Coordinates with the air liaison officer (ALO) and makes recommendations to the fire-support coordinator for the use of air alert aircraft.
- (13) Maintains appropriate records pertaining to air fire support.

- (14) Coordinates bomb line changes recommended by subordinate units and submits them to corps FSCC or, in emergencies, direct to the fire support coordinating agency at field army.

f. The Division G2 Air (or His Representative)—

- (1) Represents the G2.
- (2) Prepares preplanned requests for tactical air reconnaissance for submission to corps G2 air.
- (3) Coordinates requests for immediate tactical air reconnaissance missions and forwards these requests direct to the fire support coordinating agency at field army.
- (4) Maintains appropriate records pertaining to aerial reconnaissance missions requested by and executed for the division.
- (5) Coordinates with G2 air officers at higher echelons on matters pertaining to aerial reconnaissance and aerial photography.
- (6) Coordinates with the division artillery intelligence representative and the division G2 on matters pertaining to reconnaissance, surveillance, and aerial photography by divisional units.
- (7) Recommends to G2, after coordination with the division artillery intelligence representative, the distribution of aerial photographs.
- (8) Coordinates with the division artillery intelligence representative on target intelligence requirements for photographic interpretation.
- (9) Keeps FSCC personnel informed of the enemy situation, enemy capabilities, and weather and terrain affecting operations.
- (10) Coordinates aerial reconnaissance missions with supporting fires; e.g., arranges with other members of the FSCC for flak suppression fires and restrictions of friendly fires as necessary.
- (11) Monitors the spot report receiver system.
- (12) Establishes target plans and programs in coordination with the division artillery commander or his operations or intelligence representative.

g. The Division Tactical Air Liaison Officer (ALO)—

- (1) Advises the division commander and staff, including the fire support coordinator, on matters pertaining to air operations.
- (2) Provides technical assistance in formulating require-

ments for tactical air missions, including assistance to the G3 air in preparing the air fire plan.

- (3) Keeps personnel of the FSCC informed of air support missions in the division area.
- (4) Monitors the coordination of ground fire and friendly air operations.
- (5) Receives information from reconnaissance or other tactical aircraft for transmission to interested ground force elements.
- (6) Obtains forward air controllers required by the division.
- (7) Supervises the activities and assignments of forward air controllers allocated to the division.
- (8) Allocates flights, in accordance with the requests of G3 air, to forward air controllers for further direction onto targets during periods when aircraft have been allotted to the division and at such other times as authorized.
- (9) Maintains liaison with the ALO at corps.
- (10) Assists in the preparation of the air support and nuclear support portions of the fire support plan; assists in the preparation of the air fire plan and nuclear fire plan.

h. The Division Naval Gunfire Officer (NGFO, Army Officer)—

- (1) Advises the division commander and staff, including the fire support coordinator, on matters pertaining to naval gunfire support.
- (2) Assists in the preparation of the naval support and nuclear support portions of the fire support plan.
- (3) Assists in the preparation of the nuclear fire plan.
- (4) Prepares the naval gunfire plan, assists in the coordination of the naval gunfire plan with other fire plans, and assists in the integration of the naval gunfire plan and the fire support plan.
- (5) Assists, when necessary, in the transmission of firing data between the observer and the supporting ship(s).
- (6) Insures that the supporting ship(s) are informed of the situation ashore.
- (7) Disseminates intelligence obtained from naval sources to interested agencies.
- (8) Coordinates and processes requests from subordinate units for additional naval gunfire support.

*i. The Assistant Naval Gunfire Officer (Navy Officer)—*Advises the naval gunfire officer (army officer) on the techniques and capabilities of naval gunfire, ammunition supply, and communication.

j. The Division Staff Chemical Officer. When the division employs chemical, biological, or radiological agents, weapons, or munitions, the division staff chemical officer performs the following duties as a member of the FSOC:

- (1) Advises the division commander and staff, including the fire support coordinator, on matters pertaining to chemical, biological, and radiological warfare (CBR).
- (2) Assists in the preparation of the fire support plan as appropriate.
- (3) Prepares the chemical, biological, and radiological fire plans, assists in the coordination of these fire plans with other fire plans, and assists in the integration of these fire plans and the fire support plan.
- (4) Coordinates and processes requests from lower echelons for immediate chemical, biological, and radiological support.
- (5) Maintains appropriate records.
- (6) Keeps FSOC personnel informed of the chemical, biological, and radiological situation.

Section III. PROCEDURE

230. General

a. Commander's Concept of Operation. The concept of operation is a verbal statement or graphic portrayal of a commander's assumptions or intent in regard to an operation. The concept is designed to give the overall picture of the operation and is included in plans and orders primarily for additional clarity of purpose. The commander's guidance and general plan for the employment of available fire support, to include his guidance and general plan for the employment of nuclear weapons, will be included in the concept of operation.

- (1) The commander may announce his concept of operation either orally or in written form. When written, the concept is normally contained in paragraph 3a of the operation order (apps. II and III). However, if the concept is lengthy, it may be issued as a separate annex to the operation order.
- (2) The fire support portion of the commander's concept of operation is the basis for the fire support plan (*c* below).

b. Guidance for the Employment of Nuclear Weapons. To facilitate planning, the commander's basic guidance for the employment of nuclear weapons should be included in standing operating procedure (SOP). Modifications in this guidance should be in-

cluded as necessary in the commander's concept of operation. The commander's guidance for the employment of nuclear weapons should include—

- (1) The desired result of the nuclear attack. This should include the damage or casualties desired, or both.
- (2) Contingent requirements: for example, no significant fallout; target(s) to be left undamaged; etc.
- (3) The degree of risk to which the commander is willing to expose his own troops; for example, no more than negligible risk to friendly troops.
- (4) Degree of assurance (if other than SOP) that damage, casualty, troop safety, and contingent requirements will be met. Generally, there should be a high assurance that desired results will be achieved.

c. Operation Order. The bulk of the information and instruction pertaining to fire support is contained in the fire support plan annex to the operation order. However, the operation order does contain sufficient information and instructions to give the supported units an indication of the fire support available to them. Fire support agencies not under the command or control of the force commander are mentioned in paragraph 1b of the operation order. Fire support agencies under the force commander's control are listed in appropriate subparagraphs of paragraph 3; as a minimum, artillery organization for combat is given in paragraph 3.

d. Fire Support Plan. The fire support plan is the announcement of the commander's decisions concerning the employment of fire support. It is the coordinated and integrated plan for the employment of all fire support available to the commander. The fire support plan amplifies the fire support portion of the commander's concept of operation (*a.* above) by providing specific information and instructions relative to fire support.

- (1) The fire support plan is published as an annex to the force operation order. Its form is, in general, that prescribed for the operation order.
- (2) Appendixes to the fire support plan annex are published as required in whatever form is most appropriate. Listed below are some of the appendixes that may be required.
 - (a) Artillery fire plan.
 - (b) Naval gunfire plan.
 - (c) Air fire plan.
 - (d) Nuclear fire plan.
 - (e) Chemical, biological, and radiological fire plans, if complicated. Normally, if these fire plans are simple, the

necessary information will be included in the fire plan of the appropriate fire support agencies.

- (f) Other plans, instructions, or information, as appropriate.
- (3) The fire support coordinator is responsible for preparation of the fire support plan, and for insuring that the fire plans for the various means of fire support are coordinated throughout their development and use. He is further responsible during the operational phase for the coordinated application of fire support, but the details of that application are the responsibility of the representatives of the fire support agencies concerned.

231. Assignment of Missions

a. Missions are based on targets reported by forward observers, aerial observers, other sources and agencies, or on fires called for by the higher or supported unit or force. More than one means of fire support may be used to attack a target.

b. In selecting the means of fire support for a particular mission, the supported or force commander and the fire support coordinator may consider the following factors:

- (1) Type of fire support requested or called for.
- (2) Nature and characteristics of the target.
- (3) Effect desired on the target, such as neutralization, destruction, interdiction, or harassing fires.
- (4) Characteristics, capabilities and limitations of the weapon and its ammunition; e.g., accuracy, mobility, range, yield, and detailed effects.
- (5) The most economical means of delivery.
- (6) Availability, based on allocations and established priorities, of the various types of fire support means and their ammunition supply.
- (7) Relative difficulty of ammunition supply.
- (8) Speed of execution.
- (9) Problems of weather and terrain.
- (10) Vulnerability of the means to be used.
- (11) Effect on morale of enemy and friendly troops.
- (12) Effect of suppression of friendly fires during an air strike, if required.
- (13) Communication facilities available.
- (14) Safety of friendly troops.
- (15) Predicted post-strike condition of the target area.
- (16) Tactical benefits to be gained.

232. Operation

The coordination of fire support is effected without adversely affecting any of the present methods used for obtaining delivery of fire.

a. Artillery. When artillery fire is to be employed to attack a target, the artillery commander determines whether the target is suitable for attack by available artillery. If the mission can be fired by the artillery available to the echelon concerned, it is fired in the normal manner. If other artillery fires are required, they are requested from the next higher artillery echelon.

b. Naval Gunfire. When naval gunfire is to be employed to attack a target, it is fired by the direct or general support ship(s) of the echelon concerned using naval gunfire procedures. If additional naval gunfire is required, assistance is requested of the next higher echelon.

c. Tactical Air Support. Requests for preplanned tactical air support are forwarded to each successive higher echelon and from corps to the fire support coordinating agency at army. Requests for immediate tactical air support are submitted from battle group, armored infantry battalion, or armor battalion (combat command or task force if request originated at this level) direct to the division G3 air, then direct to the fire support coordinating agency at army. Such requests are monitored by intermediate echelons which indicate approval by remaining silent.

d. Nuclear. Nuclear fire requests are processed through command channels. Procedures are designed to insure rapid transmission and delivery of requests to the commander or his representative authorized to act on the request. Requests for nuclear artillery fires are also sent through fire direction channels to alert the fire direction center and to insure delivery by using a dual transmission. The decision to employ or not to employ nuclear weapons rests with the commander or his designated representative.

CHAPTER 12

FIRE PLANNING

233. General

a. Every artilleryman must know how to plan terrestrial fires and coordinate them with the supported unit. A thorough knowledge of fire planning is necessary if maximum effect is to be obtained from the available artillery support. Fire planning is conducted by artillery headquarters of all levels.

b. Fire planning is continuous. The detail with which artillery fire plans are made depends on the time available for planning, the extent and accuracy of target locations, the type of operation in which the supported unit or force is to be engaged, and the requirements of the fire support plan of the higher echelon.

c. Fire planning does not cease with the issue of a plan but continues throughout the operation. Seldom, however, can artillery fire planning be divorced from the employment of other supporting weapons. All elements of the fire support plan (ch. 11) must be considered in preparing the artillery fire plan.

234. General Factors

The artillery supports the attack of the hostile position by—

a. Attacking enemy defensive areas and emplaced weapons.

b. Destroying hostile command, observation, and communication installations.

c. Blocking the movement of reserves.

d. Disrupting assembled hostile armored forces.

e. Massing its fires on targets of decisive importance at the critical moments of the attack.

f. Delivering close supporting fires in accordance with the requests of the supported units.

g. Protecting supported units during their periods of reorganization.

h. Neutralizing the enemy's artillery, mortars, and similar weapons.

235. Considerations in Fire Planning

The following factors must be considered in fire planning:

a. The mission of the supported unit.

- b. The concept of operation of the supported unit commander.
- c. Requirements of the fire support plan of higher headquarters.
- d. The general location, time, duration, and priority of fires desired.
- e. Information of the enemy.
- f. Artillery and ammunition available.
- g. Other fire support means available.
- h. Artillery observation requirements.
- i. Common index for terrain, as established by the force and utilized by the artillery.
- j. Emergency signal for lifting or shifting of fire.

236. Planning Process

a. General. Successful operations depend on detailed coordinated plans. The planning process consists essentially of the following:

- (1) Collection of accurate target information (ch. 9).
- (2) Selection of targets best suited for attack by the available artillery (ch. 10).
- (3) Estimation of the artillery and ammunition needed to obtain the desired effects on the target (pars. 180–182).
- (4) Preparation of a detailed artillery fire plan for the employment of artillery against known targets and against any other targets which might be discovered.

b. Battle Group Artillery Fire Planning. The fire planning conducted by battle group artillery is described in detail in FM 6–18 and FM 6–21. In general—

- (1) Battle group artillery bases its fire plans on the requirements of the division and battle group fire support plans and the requests for fires of the supported units of the battle group.
- (2) The fires of battle group artillery having a reinforcing mission are planned by the reinforced unit. The fires of division artillery units with a mission of reinforcing battle group artillery are planned by the battle group artillery.
- (3) The fires of division artillery units having a general support or general support-reinforcing mission may be planned in detail by division artillery or may be allotted in bulk or in part to direct support reinforced, or battle group artillery.

c. Battalion Fire Planning. Fire planning conducted by battalions is described in detail in FM 6-101. In general—

- (1) Direct support battalions develop their fire plans from the requirements of the division fire support plan and the supported unit's requests for fires.
- (2) Fires of field artillery battalions having a reinforcing mission are normally planned by the reinforced unit. The fires of corps artillery battalions with a mission of reinforcing a division artillery are planned by division artillery or division artillery battalions, depending on the manner in which the reinforcing mission is being executed.
- (3) Fires of field artillery battalions having a general support mission are normally planned in detail by a higher artillery headquarters.
- (4) Fires of field artillery battalions having a general support, reinforcing mission may be planned in detail by a higher artillery headquarters or may be allotted in bulk or in part to the reinforced artillery unit.

d. Group Artillery Fire Planning. Artillery groups are not responsible for the preparation of fire plans unless directed to prepare fire plans by the headquarters to which they are attached.

e. Division Artillery Fire Planning. Division artillery fire planning has as its objective the coordinated field artillery fire support of the division as a whole. Depending on the situation, fire planning may vary from the mere checking of battle group artillery or direct support battalion fire plans in a rapidly moving situation to the preparation of the complete and highly detailed plans required in the attack of a fortified position.

- (1) A division artillery fire plan is usually initiated by planning fires for the division general support artillery on hostile mortar locations, on targets requested by or beyond the range of battle group artillery or direct support battalions, and on targets of interest to the division as a whole. Fire plans of battle group artillery or direct support artillery battalions are coordinated, augmented where necessary by general support and reinforcing fires, and integrated with the fire plan for the general support artillery.
- (2) The division artillery fire plan, when completed, is reproduced and disseminated. However, it continues to be modified as necessary to meet changes in the situation.

f. Corps Artillery Fire Planning. Corps artillery fire planning has as its objective the coordinated field artillery fire support of

the corps as a whole. Corps artillery maintains liaison and communication with each division artillery within the corps to facilitate prompt action on requests for fire and coordination of fires of mutual interest. In addition, liaison and communication are maintained laterally between corps artilleries and division artilleries for the same purpose. Flexibility in fire planning is facilitated by evolving both primary and alternate artillery fire plans concurrently from the beginning of the planning phase.

- (1) Preparation of the detailed corps artillery fire plan is initiated with fires being planned in the corps zone on hostile battery locations, targets beyond the range of division artillery, and targets of importance to the corps as a whole.
- (2) Artillery fires requested by lower echelons are included in the corps artillery fire plan.
- (3) The corps artillery fire plan is modified as necessary to meet changes in the situation.
- (4) An example of the checklist method of preparing a schedule of corps artillery fires is shown in appendix IV.

g. Army Artillery Fire Planning.

- (1) The army artillery is responsible for detailed fire planning for the artillery retained under army control. Because of the capabilities of army artillery, fires are planned on targets beyond the capabilities of corps artillery weapons, on targets for which fire is requested by corps, and on targets of interest to the army as a whole.
- (2) Coordination with corps must be accomplished if fires are planned within the corps zone of responsibility or if the corps' operations may be affected.
- (3) The army artillery fire plan is coordinated by the army artillery commander with the air fire plan, naval gunfire plan, and nuclear fire plan.

237. Planning Procedure

a. The fire support plan is formulated by the fire support coordinator (par. 221*b*), as directed by the supported commander. It amplifies the fire support portion of the commander's concept of operation (par. 230*a*) by providing specific information and instructions relative to fire support.

b. The fire support plan forms a basis for the preparation of the artillery fire plan.

c. A good artillery fire plan, like a good organization for combat, must—

- (1) Provide adequate support for the supported unit.
- (2) Provide massed fires where required.
- (3) Use available weapons according to their best capabilities.
- (4) Facilitate future operations.

238. Technique of Fire Planning

a. Definitions. The following terms used in artillery fire planning must be understood before the technique of fire planning can be discussed:

- (1) *Fire plan.* The tactical plan for using the weapons of a unit so that their fire missions will be coordinated.
- (2) *Planned fires.* Fires (concentrations) planned on areas and targets on which a need for fire can be envisaged. Targets or areas may include known enemy locations, avenues of approach, suspect observation posts, suspect weapon locations, assembly areas, critical terrain features, industrial locations, communication centers, and other similar installations.
- (3) *Prearranged fire.* Planned fire which is to be delivered at a specified time or for which a need for rapid delivery is anticipated and for which firing data are prepared in advance and kept current.
- (4) *Scheduled fires.* Prearranged fires which are to be delivered at a specific time during the maneuver or operation of the supported force. (Time is specified in terms of before or after H-hour or on accomplishment of a predetermined movement or task.)
- (5) *On-call fires.* Planned fires which are to be fired as requested. These fires may be prearranged or may be planned as to location only.
- (6) *Concentration.* A volume of fire placed on an area within a limited time, or an area designated and numbered for future reference as a possible target.
- (7) *Group of fires.* Two or more concentrations covering a tactical locality too large to be covered by a single concentration. The concentrations within a group of fires may be fired individually, consecutively, or concurrently. A group of fires may be designated by a letter and numeral combination.
- (8) *Program of fires.* Number of concentrations and/or groups of fires that are planned on *targets of a similar nature* and fired in accordance with a time schedule. An example is the countermortar program planned by division artillery.

- (9) *Series of fires.* Number of concentrations or groups of fires planned to *support a maneuver phase*. An example is the series of fires planned on an objective area just prior to the final assault. A series of fires may be indicated by a code name.
- (10) *Preparation.* Intense prearranged fire delivered in accordance with a time schedule, in support of an attack, to disrupt the enemy's communications, disorganize his defenses, and neutralize his fire support means. Preparations commence prior to, at, or after H-hour and continue until lifted either on a prearranged time schedule or on request of the assault elements. A preparation may include nuclear and nonnuclear fires of naval, ground, and air means.
- (11) *Counterpreparation fire.* A system of intensive prearranged fires delivered when the imminence of the enemy attack is discovered. It is designed to break up enemy formations; disorganize the enemy's systems of command, communication, and observation; decrease the effectiveness of his artillery preparation; and impair his offensive spirit.
- (12) *Barrage.* A prearranged barrier of fire designed to protect friendly troops and installations by impeding enemy movement across defensive lines or areas. Its normal ground use is in the establishment of prearranged final protective fires which include coordinated employment of artillery fires, mine fields, and other barriers, obstacles, machinegun fire, and infantry mortar fires.
- (13) *Schedule of fires.* A tabular or graphical presentation of scheduled fires which is fired in a definite time sequence. The time of starting the schedule may be on call, at a prearranged time, or on the occurrence of a specific event.
- (14) *Supporting fire.* Fires delivered while the supported troops are engaged in either the attack or the defense. Supporting fires may be prearranged as to both time and place (scheduled fires), or they may be prearranged as to location only and fires on request (on-call fires). Targets on which fires are not prearranged are known as targets of opportunity (pars. 239 and 240).

b. Artillery Fire Plans. Artillery fire plans are prepared by the operations personnel at each artillery echelon in accordance with instructions relative to fire support. The fire plan has five component parts—a graphical portion showing the planned concentrations, a target list, marginal information which includes

requests for additional fires, a schedule of fires when appropriate, and a table of groups of fires when appropriate.

c. Detailed Steps in Preparing the Artillery Fire Plan.

- (1) A list of *known* targets is compiled by utilizing all possible sources. Maps, photographs, enemy dispositions, and other sources of information are used to obtain a list of *suspected* targets. This information is provided to operations personnel.
- (2) Concurrently, the concept of operation of both the force and the supported unit commanders and their special requirements for artillery fire are obtained.
- (3) Operations personnel, assisted by intelligence personnel, study targets to determine the best method of attack.
- (4) Concentrations are planned to cover critical areas and known and suspected targets within the zone of planning responsibility.
- (5) To the extent possible, fires are planned as requested by lower echelons. However, the special requirements of the force or supported unit commander, and of higher echelons, are accepted as they are received and included in the plan.
- (6) When time permits, artillery fire plans of lower echelons are coordinated to insure boundary coverage, eliminate unnecessary duplication, and to insure conformity with instructions relative to fire support.
- (7) Lower artillery echelons request the next higher artillery echelon to plan fires on specific targets or areas beyond the capabilities of weapons available at the lower echelons.
- (8) The next higher artillery echelon supplements the artillery fire plans of lower artillery echelons with the fires of available artillery weapons.
- (9) Groups, series, and programs of fires are prepared as required by the appropriate artillery echelon.
- (10) Schedules of fire are prepared when appropriate. In scheduling fires, the capabilities of each unit are determined in terms of the targets it can attack. Considering the artillery commander's orders and policies, the fires of the units capable of attacking the fewest numbers of those targets selected are scheduled to the extent of their capabilities. This elimination process is continued until the attack of the selected targets is scheduled. See appendix IV.
- (11) Throughout the preparation of artillery fire plans, co-

ordination is required with supported units; other supporting agencies; and higher, lower, and adjacent artillery echelons.

239. Targets of Opportunity

Since targets of opportunity are normally fleeting in nature, they must be taken under fire as quickly as possible. Firing on targets of opportunity involves essentially the same considerations as for prearranged fires; however, the targets are attacked immediately as they arise. To attack these targets effectively the time elapsing between the formation of the target and the attack must be reduced to a minimum by—

a. Employment of adequate reconnaissance and intelligence agencies by the commander.

b. Direct exchange of information and/or intelligence to and from higher, lower, and adjacent units.

c. Employment of a weapon which can most quickly place effective fire on the target.

d. Having ammunition prepared and ready for use.

e. Rapid analysis of the target and prompt development of the decision to fire, and subsequent fire order.

f. Close and continuing coordination with interested personnel and agencies.

240. Nuclear Targets of Opportunity

a. Definition. Nuclear targets may be considered as prearranged or targets of opportunity. Nuclear targets of opportunity have the following characteristics:

(1) They are observed in the course of an operation and have not been previously considered or analyzed.

(2) They have the capability of altering their characteristics within a period of time to such an extent as to be no longer a nuclear target. There must be some indication that the target will retain its characteristics for the period of time necessary to deliver a nuclear weapon.

b. Delineation Between Nuclear and Nonnuclear Targets of Opportunity. Targets of opportunity suitable for attack by nuclear artillery must be differentiated from targets of opportunity for nonnuclear field artillery weapons. These differences are discussed in *c* through *h* below.

c. Time Requirements. The time required to deliver nuclear weapons, after the target information is available, is dependent on three primary factors. The first of these is the time required to

process the information into a specific recommendation by the staff and to permit the commander or his designated representative to arrive at a decision. If authority to employ nuclear weapons is retained at higher echelons, this time element becomes significant. The second factor is the time required after the decision has been reached and the fire mission has been assigned to the artillery element. The time required to compute data and prepare the nuclear weapon for firing can be partially concurrent with obtaining the commander's approval by issuing timely warning orders. The third factor is the time required to warn troops and aircraft within the radius of the weapon effects.

d. Reaction Time. The reaction time varies with the nuclear delivery system employed, so that a target suitable for the 280-mm gun or the 8-inch howitzer may not be appropriate for a system requiring a longer period of preparation. To be a valid target, a nuclear target of opportunity must persist for a period greater than the reaction time for the specific nuclear delivery capability. With present nuclear delivery systems and present procedures for processing a target, a target availability time of at least 30 minutes is considered necessary for the simplest and most responsive systems. This time increases with the complexity of the system.

e. Target Size. Consideration must be given to the extreme radius of effect of nuclear weapons and the area of terrain affected by these weapons. In this connection, nonnuclear artillery has the flexibility necessary to attack targets occupying very small areas as well as those occupying larger areas; the larger areas require multiple units and a heavy expenditure of ammunition with a comparatively low order of "target kill." Conversely, nuclear weapons used to attack small area targets risk an expensive overkill. Therefore, the amount of terrain or area occupied by the target becomes an important consideration in using nuclear weapons.

f. Target Density. The target should be populated with enough enemy military personnel and materiel so that the destructiveness of the nuclear capability will be realized to the desired maximum. Density becomes a critical factor in evaluating nuclear targets when the objective is to destroy personnel or materiel. The density of a target may be more important than its size in considering its suitability as a nuclear target, since density within a target increases the effectiveness of nonnuclear artillery as well as nuclear artillery.

g. Tactical Importance. Certain targets may possess sufficient tactical importance to warrant attack by nuclear weapons without regard for the size or density of the target. For example, an ene-

my nuclear delivery means may pose such a threat to the opposing commander that it becomes an immediate target of opportunity. Other examples are an attacking force in process of a breakthrough that will jeopardize an entire operation; a denial operation concerned with contamination or barriers rather than personnel; a beachhead or bridgehead situation threatened with certain disaster by an identifiable force.

h. Target Information. The timely acquisition of target information is essential to enable the commander to properly influence the action with his available nuclear firepower. All available sources of information must be fully exploited. In contrast to targets of opportunity for nonnuclear artillery, visual identification of a nuclear target of opportunity will be more difficult and will usually require corroborating information. The artillery forward observer and the aerial observer are located to provide early information of observed enemy activity which may indicate personnel concentrations or installations suitable for attack by divisional nuclear artillery. A single observer may be incapable of providing all of the information required by the commander or his designated representative in making a decision to employ nuclear weapons; however, his reports constitute a primary source of information and at times, as in the case of an enemy breakthrough, may be the only reliable source of information available.

241. Flak Suppression

Flak suppression missions may be fired by artillery on request of appropriate tactical air commanders to reduce interference with close air support missions. These fires must be prearranged to insure engagement of all known enemy air defense artillery positions within range of artillery fire. Air force flak intelligence agencies furnish the target data to appropriate artillery commanders. Requests for and coordination of flak suppression missions are conducted through the air-ground operations system.

242. Field Artillery Support for Offensive Operations

The artillery fire plan for offensive operations may consist of a preparation and subsequent fires supporting the attack. The preparation is normally delivered during the period prior to the advance of the attacking echelons from their line of departure and may continue for a short time thereafter.

a. Preparation.

- (1) Fires planned for the preparation are usually limited to known targets and to areas that are strongly suspected of containing remunerative targets. Targets located during the firing of a preparation are engaged by unsched-

uled delivery units or by delivery units firing on targets of lesser immediate importance to the accomplishment of the mission. Deletion of scheduled fires should be fully coordinated consistent with the threat imposed and time available for coordination.

- (2) The commander of the attacking force determines whether there is to be a preparation and its duration. He considers—

- (a) Whether the probable effect of the preparation will justify the attendant loss of surprise.
- (b) Available artillery and the supply of ammunition.
- (c) The number of remunerative targets that can be located in time to prepare and assign fires.
- (d) Whether the effect sought can be accomplished before the enemy can change his major tactical dispositions in time to meet the attack. This is of particular importance where nuclear fires are delivered in conjunction with an exploitation.

- (3) Preparations may be divided into phases to permit concentration of fires successively on the various types of targets. The number, order, and length of phases are varied to fit the particular situation. Safety measures for aircraft may require a separate phase for attack of targets by tactical air. The following example is general in nature and does not preclude firing or scheduling fires on any type of target during any phase:

- (4) The *approximate* time length of a nonnuclear preparation can be determined by considering the number of known targets, the planning time for each target, the number of available field artillery battalions, and the artillery commander's policy concerning the number of battalions to use in attacking each target. Planning time includes the length of time required to fire on a target, plus the time to shift to a new target. The commander's policy is the number of battalions to fire on a target; for example, he may prescribe that 1 medium and 1 heavy battalion fire on each target in the preparation. In this case, the policy figure is 2. The formula used is—

$$\text{Time length of preparation} = \frac{(\text{number of tgts} \times \text{planning time} \times \text{policy})}{\text{number of battalions}} \times 1.3$$

The same formula may be used to find the number of targets that can be attacked during a preparation of a specified length. In determining the number of targets, the 1.3 factor in the formula is disregarded. By substituting "number of batteries" for "number of battalions"

in his formula, it may be used when the commander's policy is expressed in terms of batteries.

(a) *First phase.* Corps and army artillery, reinforced as required by elements of division artillery, execute counterbattery fires to gain superiority over the hostile artillery. Units not required for counterbattery fires interdict routes and neutralize enemy command, communication, and observation systems. Division artillery executes countermortar fires.

(b) *Second phase.*

1. Corps and army artillery maintain counterbattery neutralization fires and initiate medium and long-range interdiction fires. The remaining corps and army artillery fire on command and communication centers and reinforce division artillery as required.
2. Division artillery maintains countermortar neutralization. Reinforced as necessary, division artillery neutralizes enemy command, communication, and observation facilities, neutralizes defensive areas, weapons, reserves, and assembled mechanized units; and destroys obstacles.
3. Battle group artillery neutralizes enemy communication and observation facilities, defensive areas, and weapons.

(c) *Third phase.*

1. Corps and army artillery continue to maintain counterbattery neutralization fires. Units not required for counterbattery fires reinforce division artillery in neutralizing enemy defensive areas and observation.
2. Division artillery delivers massed fires successively on defensive areas in the forward portion of the enemy position with priority to known defensive elements that most seriously threaten the success of the supported unit's attack.
3. Battle group artillery continues neutralization fires with priority to those defensive elements which most seriously threaten the success of the supported unit's attack.

b. *Fires Supporting the Attack.*

- (1) Fires planned in support of the attack are shifted in conformity with the movements of the supported unit(s). Fires are planned in the form of concentrations, groups of fires, and series of fires to be fired on a time schedule or on call.

- (2) Fires supporting the attack are planned by each echelon to—
- (a) Assist the advance of the supported units by attacking targets as required.
 - (b) Assist the supported units in gaining fire superiority on each successive objective so that the assault echelons can close to assaulting distance.
 - (c) Protect the supported units during periods of reorganization.
 - (d) Assist in breaking up enemy counterattacks. When likely assembly areas and routes for enemy counterattacks can be determined, concentrations are planned to be fired on call.
 - (e) Continue the neutralization of hostile observation.
 - (f) Continue the neutralization of hostile artillery, mortars, and automatic weapons.
 - (g) Prevent the enemy from reinforcing, supplying, or disengaging his forces.
 - (h) Disrupt the enemy's command and communication systems.

243. Field Artillery Support for Defensive Operations

a. General. For planning purposes, defensive fires are divided into the following four categories:

- (1) Fires delivered before the enemy forms for the attack.
- (2) Counterpreparation.
- (3) Fires during the enemy attack.
- (4) Fires in support of the counterattack or in support of limited offensive action associated with the counterattack.

b. Fires Delivered Before the Enemy Forms for Attack. Fires delivered before the enemy forms for the attack include interdiction and harassing fires that will force the enemy into early deployment and fires in support of covering forces and outposts.

- (1) Harassing and interdiction fires are usually planned by division, corps, and army artilleries.
- (2) Fires in support of a covering force are usually planned by the highest artillery echelon with that force. Additional fire support by the artillery with the general outpost force and with the main defensive force is planned to cover the withdrawal of the covering force.
- (3) Fires in support of the general outpost force are usually planned by the artillery with that force. Additional fires by the artillery with the main defensive force may be

planned in support of the general outpost force and will be planned to cover its withdrawal.

- (4) Artillery supporting a covering force or general outpost force will usually fire from forward positions to prevent disclosing to the enemy the artillery positions to be used to support the battle area.
- (5) Time of opening fire is decided by the force commander except for fires in support of a covering force or outpost. Premature firing will expose the artillery to neutralization and may reveal the plans of the defending force. Therefore, firing is usually confined to dangerous or highly remunerative targets.
- (6) Harassing and interdiction fires are prearranged to the maximum extent possible. They are based on studies of maps, terrain, road nets available to the enemy and all available target intelligence. Targets suitable for harassing fires are hostile batteries, industrial installations, assembly areas, observation posts, communication centers, command posts, and leading enemy elements. Interdiction fires on communication centers, harbors, command posts, road junctions, bridges, and crossroads may be profitable. These fires should be irregularly spaced to prevent giving the enemy a predictable pattern of fire.

c. Counterpreparation.

- (1) A counterpreparation consists of prearranged fires designed to disrupt the enemy's preparations for an attack. All the field artillery with the force is involved, but fires are delivered only on order of the force commander. A counterpreparation includes fires on suspected assembly areas, enemy command and observation posts, communication centers, lines of communication, and hostile artillery positions.
- (2) The general missions for the various echelons preparing counterpreparation fires are—
 - (a) *Corps and army artillery*—Counterbattery and reinforcing fires and deepening the fires of the division artillery.
 - (b) *Division artillery*—Neutralization of known or suspected enemy routes, assembly areas, and attack positions; of enemy communication, observation, and command facilities; of hostile forward elements; of known or suspected assemblies of enemy tanks and reserves. Divisional medium and heavy cannon artillery and missile artillery may reinforce the corps artillery counterbattery fires.

(c) *Battle group artillery*—Neutralization of enemy attack positions, enemy observation and communications, and the most forward hostile elements.

- (3) Premature firing furnishes the enemy with counterbattery data for his artillery preparation, indicates to the enemy what areas are to be avoided in forming for the attack, and expends ammunition that may not be replaceable.

d. Fires During the Enemy Attack.

- (1) If the enemy is successful in launching his attack, artillery fires are delivered to break up the enemy attack formations, to repel his assault on the battle area, and to limit the enemy penetration.
- (2) Planning of defensive artillery fires is centered chiefly at battle group artillery or at the direct support artillery battalions. Division, corps, and army artilleries plan counterbattery fires. Division and corps artilleries also plan fires to reinforce the final defensive fires of the battle group artillery or the direct support battalions.

e. Fires Supporting the Counterattack. Fires supporting the counterattack are prearranged to the greatest extent practicable and may include a preparation and fires in support of the attack (par. 242b). Artillery fires during the counterattack are delivered in close support of the counterattacking force to destroy the enemy within the penetrated area and to prevent his reinforcing the penetrated area.

244. Nuclear Fire Support

a. General. Nuclear fire represents firepower of great magnitude and importance to the force commander in the accomplishment of his mission. The use of this firepower may be prearranged on targets capable of exercising significant impact on his ability to accomplish the mission. While the application of combat power (to include fire and maneuver) must always be coordinated, the magnitude of nuclear fires are such that the commander may utilize nuclear fires to support his maneuver elements or he may employ his maneuver elements to exploit nuclear fires. In either case, integration of his nonnuclear fire support, as well as other tactical support means, is effected. Since the field artillery provides the principal nuclear fire support available to the ground force commander, artillery commanders and staffs at all echelons must be thoroughly familiar with the characteristics, capabilities, and limitations of nuclear fire support. The general characteristics of nuclear fire support are discussed in FM 101-31. Techni-

cal details and tabulated effects are covered in TM 23-200 and FM 101-31A.

b. Security of Nuclear Fires. Security is of utmost importance when nuclear fires are to be employed, since advance warning will permit the enemy to take defensive measures which will greatly reduce the effectiveness of the nuclear fire. Only those units involved in the delivery of the nuclear weapon, and friendly units affected (to include flash blindness), should be informed of the impending nuclear burst. Notification must be given at the latest possible time which will permit the delivery agency to accomplish its mission and permit the friendly troops to take necessary safety measures and to adequately plan exploitation. Security of nuclear attack must be stressed in the training of all combat troops.

c. Nuclear Fire Plan. The considerations, procedures, and general steps in the planning process for nuclear fires are essentially the same as those for nonnuclear field artillery fire planning (pars. 235-237). Plans for nuclear fires are normally published in a nuclear fire plan but may be included in the fire plan of the appropriate fire support agency. In any case, the nuclear and nonnuclear fires must be carefully and fully coordinated for maximum effect. The nuclear fire plan is normally prepared in the FSCC at division and corps level and in the fire support section of the tactical support coordinating agency at army level. The determination of suitable nuclear targets and means of attack are based on detailed target analyses accomplished in the fire support coordination center under the supervision of the fire support coordinator.

d. Preparation of the Nuclear Fire Plan. The nuclear fire plan is prepared in essentially the same form as the artillery fire plan (par. 238*b* and *c* and app. III). However, the technique of nuclear fire planning differs in the following respects:

- (1) Potential nuclear targets are normally analyzed in greater detail than nonnuclear targets.
- (2) Tick marks (FM 6-40) are used to show the location of desired ground zero (DGZ).

CHAPTER 13

FIELD ARTILLERY FIRE DIRECTION

Section I. ORGANIZATION AND OPERATION

245. General

a. This chapter covers the principles, procedures, and organization required for field artillery fire direction at the field artillery group, division, corps and army artillery echelons. For information on fire direction at battery and battalion levels, see FM 6-40 for cannon type field artillery and appropriate field manuals in the 6-series for missile artillery.

b. Field artillery fire direction is the tactical employment of artillery firepower, the exercise of tactical command of one or more artillery units in the selection of targets, the concentration or distribution of fire, and the allocation of ammunition for each mission. Fire direction also includes the methods and techniques used in fire direction centers to convert fire missions into appropriate fire commands.

246. Responsibilities

a. The artillery commander is responsible for artillery fires and commands all artillery units assigned or attached to his command but not further attached to other organizations.

- (1) The army artillery commander does not command artillery units assigned or attached to the corps.
- (2) The corps artillery commander does not command artillery units assigned or attached to the divisions. He may exercise a degree of control over these units in the name of and as prescribed by the corps commander. When specifically authorized by the corps commander, the corps artillery commander may direct the artillery with a division to fire on targets of importance to the corps.
- (3) The division artillery commander does not command artillery units assigned or attached to the battle groups. When specifically authorized by the division commander, the division artillery commander may direct the artillery with the battle groups to fire on targets of importance to the division. For additional information on battle group artillery, see FM 6-18.

b. The artillery commander establishes and operates a fire direction center (FDC) to insure—

- (1) Continuous, accurate, and timely artillery fire support under all conditions of weather, visibility, and terrain.
- (2) Coordination of artillery fires and integration with the fires of other fire support means.
- (3) Flexibility of artillery fires sufficient to engage all types of targets.
- (4) Prompt massing of artillery fires of all available units in any area within range.
- (5) Rapid delivery of artillery fire within the zone or sector of the supported unit or force.
- (6) Control of artillery fire through orders, policies, and priorities and by means of adequate liaison and communication.
- (7) Implementation of safety measures.
- (8) Target intelligence.

247. The Fire Direction Center

a. *Definition.* The artillery fire direction center is the element of the artillery headquarters that consists of operations, intelligence, and communication personnel and equipment by means of which the artillery commander directs artillery fires. Details concerning the operations of FDC's at battalion and lower echelons are contained in FM 6-40 for cannon-type field artillery and in appropriate field manuals in the 6-series for missile field artillery.

b. *Location.* The need for concealment, dispersion, reliable communications, access routes, and other tactical considerations influence the location for the FDC. However, the most important factor in determining the location of the FDC is the requirement to exercise control of the fires of subordinate artillery units.

c. *Organization.* The organization of the fire direction center is varied to meet the requirements and conditions existing at each echelon.

- (1) *Group FDC.* The field artillery group ordinarily is attached to another artillery headquarters. Hence, group FDC usually is not directly concerned with coordination with the supported unit or with target intelligence to the same degree as other echelons. When the group is operating as the artillery headquarters for a task force or similar organization, the group FDC functions like a division artillery FDC. When distances preclude effec-

tive control of artillery units by corps artillery, the group FDC may be called on to assume certain counterbattery functions usually performed at corps artillery. In this case, the group staff may be augmented to facilitate the discharge of this additional responsibility. Group FDC operates under the supervision of the S3.

- (2) *Division artillery FDC.* Division artillery must coordinate its fires closely with the supported unit and is vitally concerned with target intelligence. In addition, it coordinates the division countermortar activities. The division artillery FDC operates under the supervision of the S3.
- (3) *Corps artillery FDC.* The corps artillery FDC operates in much the same manner as the division artillery FDC. It coordinates counterbattery activities. The corps artillery FDC operates under the direct supervision of the corps artillery executive officer.
- (4) *Army artillery FDC.* The army artillery FDC is concerned with control of the artillery units retained under field army control and with arrangements for obtaining target intelligence. The army artillery FDC operates under the supervision of the army artillery S3.

d. Duties of Personnel. For duties of the artillery S2 and S3, see paragraphs 26 and 27. Additional duties of the S3 and duties of other members of the FDC are listed below:

- (1) *Artillery group S3.* The duties of the artillery group S3 are to—
 - (a) Supervise the operation of the FDC.
 - (b) Receive and record data from artillery units and other sources pertaining to artillery fire capabilities, requests for fire, enemy and friendly information, and displacement plans.
 - (c) Maintain an operations map or chart to include fire capabilities, zones of fire, no-fire line, 0-0 line, bomb line, and nuclear safety lines when appropriate and disseminate this information to lower artillery units.
 - (d) Maintain an accurate ammunition record of the total expenditures and the amount on hand for designated artillery units.
- (2) *Division artillery S3.* The duties of the division artillery S3 are to—
 - (a) Perform the duties in (1) above.
 - (b) Supervise the execution of artillery nuclear fires.
 - (c) Prepare countermortar plans and supervise their execution.

- (d) Prepare counterbattery plans and supervise their execution when the division is operating alone.
- (3) *Corps artillery S3*. The duties of the corps artillery S3 are to—
 - (a) Perform the duties in (1) and (2) (b) above.
 - (b) Prepare counterbattery plans and supervise their execution.
- (4) *Army artillery S3*. The duties of the army artillery S3 listed are to—
 - (a) Perform the duties in (1) and (2) (b) above.
 - (b) Prepare counterbattery plans and supervise their execution.
 - (c) Advise the army engineer of survey requirements for army artillery units.
 - (d) Maintain an operations map or chart to include the fire capabilities of army artillery, fire capabilities of corps artillery weapons which have nuclear capabilities, no-fire line, 0-0 line, bomb line, and nuclear safety lines when appropriate.
 - (e) Disseminate information on no-fire lines and other limitations on firing to army artillery units.
 - (f) Maintain a record of army artillery ammunition received, expended, on hand, and available from sources outside the army area for allocation to the army.
- (5) *Counterbattery intelligence officer (S2 section, corps artillery only)*. For duties of the counterbattery intelligence officer (CBIO), see chapter 10.
- (6) *Countermortar intelligence officer (S2 section, division artillery only)*. This officer's duties are similar to those of the counterbattery intelligence but are related to enemy mortar activities (ch. 10).
- (7) *Photo interpreter*.
 - (a) Locate enemy targets by study of aerial photographs.
 - (b) Disseminate information on targets located.
 - (c) Assist S2 as directed.
- . *Communication* (ch. 14).
 - (1) The FDC is the center of field artillery tactical communication nets. Communication is provided to higher, lower, and adjacent FDC's. Command and fire direction radio nets parallel the wire nets to supplement them or replace them entirely in rapidly moving situations or in the event of wire failure. When necessary to augment artillery communication systems, sole user circuits for fire direction purposes will be provided in the division

and army area communications systems. Instructions regarding the installation and operation of communication systems are published in SOI's, SSI's, SOP's and orders.

- (2) Type communication nets available for fire direction at field artillery group, division artillery, corps artillery, and army artillery are discussed in chapter 14.

f. Forms, Records, Reports, and Charts.

- (1) *S3 section.*

- (a) *Planning chart.* The planning chart (a map or map substitute) is a chart used with a concentration and target overlay, a fire capabilities overlay (fig. 22), and

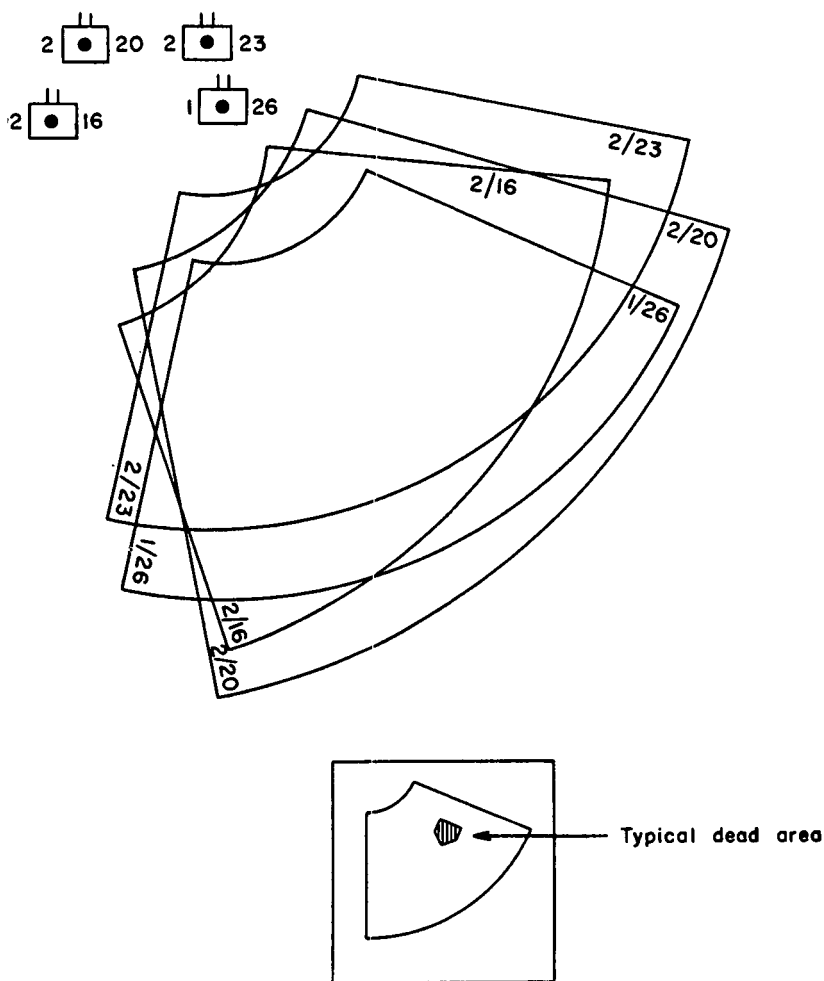


Figure 22. Fire capabilities overlay.

copies of fire plans (artillery, air, nuclear, and naval gunfire). It is maintained for the purpose of exercising tactical control of artillery fire.

- (b) *Operations chart.* An operations chart is maintained to keep abreast of the tactical situation. Overlays depicting the friendly and enemy situation and the fire capabilities of the unit or units concerned and fire plans (artillery, air, nuclear, and naval gunfire) are used in conjunction with this chart.
- (c) *S3 journal.* The S3 journal is a section journal in which all incidents, messages, and orders affecting the S3 section are recorded with an entry describing the action taken, if any. Copies of messages and orders sent and received and the record of fire missions are attached to and become a part of the S3 journal. At specific intervals the journal is closed and made a part of the unit journal.
- (d) *Record of fire missions.* The record of fire missions (DA Form 2184-R) (fig. 23) is a locally reproduced record on 10½ x 8 inch paper which shows each fire mission handled by the FDC. It includes for each target the concentration number, source, description, location, unit(s) firing, time fired, type and amount of ammunition fired, estimated effect, and other appropriate information.

RECORD OF FIRE MISSIONS (FM 6-20)						FDC: I Corps Arty			
						From: 010001 April 19			
						To: 012400 April 19			
CONC NUMBER	SOURCE	DESCRIPTION	LOCATION	ASSIGNED TO	TIME FIRED		AMMUNITION		EFFECT
					From	To	Type	Amount	
<i>EE 106</i>	<i>Aober</i>	<i>Estimated CO digging in hill 806</i>	<i>567829</i>	<i>2d Bn 70th Arty</i>	<i>1115H</i>	<i>1130H</i>	<i>HE WP</i>	<i>18 6</i>	<i>20 casualties enemy dispersed</i>

DA Form 2184-R, 1 NOV 58

Items typed in italics are for illustration purposes only

Figure 23. A type record of missions.

(e) *Periodic operations report.* The periodic operations report is a report which summarizes unit activities. It is submitted daily or as prescribed by the commander. The form is normally prescribed by the commander. Any item noted in the periodic operations report will also be noted in the S3 journal. Therefore, the periodic operations report is a summary of the S3 journal.

(f) *Command report.* The command report is a periodic narrative summary of events from the point of view of the commander. It is the medium through which the commander may record, review, and evaluate the overall activities of his command. The report is prepared under the supervision of the S3, but must be signed by the organization commander (SR 525-45-1).

(2) *S2 section.* For a discussion of the records, reports, and charts maintained by the S2 section, see chapter 10.

g. Operations. The FDC operates in accordance with the principles, procedures, and requirements discussed above and with the orders and policies of the artillery commander. The detailed operations of the S2 section relative to target intelligence and the processing of target information are discussed in chapter 10.

h. Assignment of Fire Missions. The procedures involved in attacking targets and in handling fire missions are discussed in FM 6-40 and in appropriate 6-series field manuals pertaining to field artillery missile units. The general procedures pertaining to the assignment of fire missions are outlined below.

- (1) *Groups.* Group FDC assigns fire missions direct to its attached battalions. When missions are assigned from corps or division artillery FDC direct to battalions of the group, group FDC monitors and records them.
- (2) *Division artillery.* Division artillery FDC normally calls on division general support units and on corps reinforcing units for fire missions. Battle group artillery and direct support artillery units are not called on for additional fires unless warranted by the importance of the mission. If additional artillery fire is desired, the FDC notifies the corps artillery FDC. Air or naval support is requested through the FSCC. Division artillery participates in the planning of artillery nuclear missions and assigns nuclear missions to organic, attached, or reinforcing artillery.
- (3) *Corps artillery.* Corps artillery FDC may assign fire missions to corps groups or battalions that have tactical

missions of general support; reinforcing; or general support-reinforcing. Corps artillery may call on the artillery with the division to participate in important missions. In doing so, the term "all available artillery" is employed, meaning that the fires of those units engaged in more important missions are excluded. Requests for additional artillery fire go direct from corps artillery FDC to army artillery FDC. Requests for air or naval support received at corps artillery FDC are referred to the corps fire support coordination center.

- (4) *Army artillery.* Army artillery FDC will assign fire missions to the field artillery units retained under army control. Army artillery may call on the corps artillery to participate with certain units in important missions. Air or naval support requests received at army artillery FDC are referred to the fire support coordinating agency.

Section II. MASSING THE FIRES OF MORE THAN ONE BATTALION

248. General

The massing of the fires of more than one battalion is dependent on the following requirements:

- a. Common survey control or common registration for all battalions.
- b. Adequate communication facilities to accomplish coordination and control of the firing.
- c. Adequate time for all battalions to prepare to deliver fire.
- d. Fire capabilities of the battalions.
- e. Centralized control.

249. Battalions to Fire

The battalions capable of firing on a target are determined from the artillery fire capabilities chart. In order to avoid diverting battle group artillery or direct support artillery from its primary mission, artillery units in general support normally are used when additional fire is necessary. When a unit requests additional fire, the artillery commander or his authorized representative at the fire direction center must decide whether to grant the request, the number of battalions to fire, and the amount of ammunition to be expended. The unit requesting the fire is informed of the decision.

250. Assignment of Missions

- a. *Chart Location of Target Known.* The chart location of the target may be determined by survey, by restitution from aerial

photographs or from a study of the ground by commanders, ground observers, or aerial observers. In assigning missions to battalions, the fire direction center includes in its order the coordinates and altitudes of the target, the concentration number, the nature of the target, the amount and type of ammunition, the method of fire, and the time of opening and/or lifting fire. Fire on these targets should be delivered without adjustment whenever practicable.

b. Chart Location of Target Unknown Initially. A battalion adjusting on an important target may make a request to the fire direction center of the next higher artillery headquarters for additional fire. When the battalion makes this request, it gives the approximate coordinates, concentration number, description of the target, and states that correct coordinates and altitude will be reported later. The artillery commander, or his representative, decides which battalions are to fire on the target, sends them warning orders, and informs the requesting battalion what additional fire it will receive. Communication lines are kept open. As soon as the battalion requesting the fire determines the correct coordinates and altitude, these data are sent to the fire direction center of the next higher artillery headquarters and from there to the battalions designated to fire the mission.

251. Method of Attack

The size and nature of the target will govern the distribution of the fire of the battalions. When the target area is large, each battalion may be assigned a part of the target.

252. Precautions

a. Massing Fires in Close Support of Troops. When massing fires in close support of troops, the utmost precaution must be exercised. There are inherent inaccuracies in all types of firing charts. Registration near the target or the firing of check rounds on the target must be made to avoid firing on friendly troops.

b. Firing of Units Other Than Battle Group Artillery or Direct Support Artillery. The fire direction center of a general support or reinforcing battalion, whose observers locate targets inside no-fire lines must coordinate with the battle group artillery or direct support artillery concerned before attacking such targets.

253. Procedure in Massing the Fires of More Than One Battalion on a Target of Opportunity

a. When a single battalion takes under fire a target of opportunity which requires additional fire, that battalion may request additional fire from higher headquarters.

b. The single battalion will start the adjustment and send to the fire direction center of the next higher artillery headquarters a message which will include the following elements:

THIS IS (name or number) BATTALION;
NOW ADJUSTING (or FIRING) ON (nature of target);
SIZE OF AREA (may be omitted);
APPROXIMATE COORDINATES (), ALTITUDE ();
REQUEST ADDITIONAL FIRE;
CONCENTRATION NUMBER ().

c. The higher artillery headquarters S3 receives the above message. He plots the coordinates and, according to his fire capabilities chart, selects the additional battalions that are to fire the mission.

d. The selected battalions are alerted and given the following message:

THIS IS (call sign);
FIRE MISSION;
FIRE (number VOLLEYS SHELL (type) FUZE (type);
APPROXIMATE COORDINATES AND ALTITUDE ();
CENTER RANGE (or RANGE SPREAD);
WHEN READY (or AT MY COMMAND);
ADJUSTED COORDINATES LATER;
CONCENTRATION NUMBER ().

e. The adjusting battalion will complete the adjustment, replot the target, and send the following message to the next higher artillery headquarters fire direction center:

ADJUSTED COORDINATES ();
ALTITUDE ();
NOW FIRING FOR EFFECT;
CONCENTRATION NUMBER ().

f. The adjusted coordinates and altitude are relayed to the other battalions.

g. When an enemy battery is a target of opportunity and is listed in the hostile battery list, the S3 may transmit the fire mission by referring to the grid square and name of battery shown in the hostile battery list.

h. After fire for effect has been completed, the adjusting battalion may be able to determine that the target has moved or is moving. In this case, the battalion fire direction center may send the following message to the next higher artillery headquarters fire direction center:

THIS IS (name or number) BATTALION;
TARGET HAS MOVED (so many) METERS NORTH
(SOUTH) (so many) METERS EAST (WEST);
REQUEST FURTHER ADDITIONAL FIRE.

CHAPTER 14

COMMUNICATION

254. General

The ability of field artillery to render effective fire support depends on efficient communication. The artillery commander must rely on his communication system in controlling elements of his command, in gathering information and disseminating intelligence, and in coordinating the fires of his units. Responsibility for all communication rests with the commander at each echelon. The commander exercises this responsibility through his staff communication officer, who prepares communication plans and orders and directs and supervises the installation, operation, and maintenance of the communication system and the training of personnel in the use of the various communication means available.

255. Means of Communication

Wire, radio, and messengers are the principal means of communication available to artillery. The term wire includes wire terminal and radio link equipment. Messengers may travel by aircraft or ground vehicles. Other means available are sound and visual signals. No single communication means is considered primary or is relied upon exclusively. Each communication means is supplemented by a different communication means when possible, and alternate communication capabilities within each means are established as time permits. Wire and radio communications are discussed in this chapter; for a discussion of other means, see FM 24-5.

256. Communication Discipline and Security

The speed required in processing firing data and the volume of message traffic handled make an orderly procedure necessary. Message brevity and net operating discipline are necessary in both wire and radio communication. No electronic transmission means is considered secure. Classified messages are encoded or encrypted prior to transmission by electronic means unless authorization to be sent in clear has been determined by competent authority. Communication security means available include various types of codes and ciphers as well as mechanical and electronic cipher devices. Personnel must be thoroughly familiar with and practice security measures.

257. Area Communication Systems

The area communication system, installed by Signal Corps, is used to supplement and augment artillery communication systems. The area system primarily offers a means for expeditiously establishing a wire network between artillery elements where the length of lines required is beyond the capability of the units to establish or maintain. Where the primary use of the area system is handling of logistic and administrative traffic, artillery units use the area system on a common-user basis. However, artillery is provided with sole-user circuits when using the area system as a means for transmitting artillery fire control traffic. The artillery communication officer must be provided with early information of impending displacements in order to complete necessary liaison with the agency responsible for displacement of the area system stations. For detailed information on operation of area systems, see FM 11-10.

258. Priority of Installation

In the establishment of artillery communication systems, priority of installation is given to elements of the system concerned with fire support. During movements, and in the initial phase of position occupation, reliance is placed on radio. Wire circuits are installed to parallel radio channels as soon as the situation permits.

259. Principles of Communication

The communication system employed by any artillery unit is dependent on the command structure and the type of mission in which the unit is engaged. The communication system is continually expanded and improved. Responsibility for establishing the communication system is determined in accordance with the following principles:

a. Superior to Subordinate. The higher or superior unit is responsible for establishing and maintaining communication with the lower or subordinate unit. This principle fixes responsibility in those cases where a conflict of responsibilities exists. For purposes of communication responsibility, an attached unit is considered a subordinate unit.

b. Supporting to Supported. A unit supporting another unit is responsible for establishing and maintaining communication with the supported unit.

c. Reinforcing to Reinforced. A unit reinforcing the fires of another unit is responsible for establishing and maintaining communication with the reinforced unit.

d. Lateral Communication. Lateral communication between ad-

jacent units is established and maintained as directed in the communication plan of the next higher commander.

e. Joint Responsibility. Although one unit is specifically charged with establishing and maintaining communication with another unit, it is only through the joint effort of all concerned that communication is assured. If communication is lost, its immediate reestablishment is the joint responsibility of all units affected.

260. Communication Planning

Communication planning is a continuous operation beginning with the commander's estimate of the situation. Communication planning is conducted concurrently with operational planning, and is coordinated with other staff officers. Communication planning follows the normal phases of headquarters planning described in FM 101-5. An initial estimate of the communication requirements is made to implement the operation plan of the commander. Based on this estimate, a plan is formulated which is properly integrated with the plans, SOI and SSI, of higher headquarters. Orders are issued based on this communication plan. When written, the orders normally are included as part of the operation order. The estimate provides a basis for development of the plan and the plan provides a basis for preparation of the order. Estimates are revised during the operation to keep pace with the changing tactical situation. Resultant changes to the operation order may be either written or oral. In addition to the above, the communication plan includes any administrative details necessary to clarify or coordinate signal activities of the affected units, to include wire recovery responsibilities and radio retransmission requirements.

261. Signal Operation Instructions and Standing Signal Instructions

a. Signal Operation Instructions. Signal operation instructions (SOI) are a series of standing orders issued periodically for the technical control and coordination of the signal communication within a command. They include items covering codes and ciphers, radio call signs and frequencies, a telephone directory, and visual and sound signals. The SOI is prepared by the signal officer and conforms to the SOI of the next higher unit. The SOI for a task force is prepared by the headquarters controlling the mission. Normally, units smaller than a division issue extracts of the division SOI. When authorized by higher headquarters, units of corps artillery and division artillery may prepare brevity codes, operation codes, map codes, and prearranged message codes as required.

b. Standing Signal Instructions. Standing signal instructions

(SSI) are prepared by the signal officer. The SSI contain instructions for use of the SOI and operational data which are normally not subject to frequent change.

262. Wire

a. General. Installation of a wire system is started as soon as the situation permits. Wire circuits parallel radio channels and take over the communication load as they are installed. Wire systems are expanded and improved by the installation of additional locals, duplicate circuits, and lateral lines, until the wire net fulfills the communication requirements of the situation.

b. Capabilities and Limitations. Wire communication provides a higher degree of personal contact than any other means. Operation of the equipment involved is comparatively simple. It is the most stable communication means, being almost entirely free from the effects of electrostatic disturbances, and capable of prolonged periods of trouble-free operation. Wire also offers a greater degree of security than radio and is not subject to enemy jamming.

c. Systems. For type wire communications employed in field artillery groups and corps artillery, see figures 24 and 25. For type wire communication employed in the division artillery, see appropriate 6-series field manuals (app. I). Because of the distances involved, army artillery will normally rely on the area communication system for wire communication. Through coordination with the corps signal officer, corps artillery may also use the division, corps, and army communication system. This will facilitate wire communication with artillery groups whose headquarters are located in the vicinity of a communication center of the division or army area communication system.

263. Radio

a. General. Radio is an essential means of communication for highly mobile elements. It is especially suitable for motor movements, during displacements, and in fast-moving situations. Radio supplements wire communication and replaces wire in the event of its failure.

b. Capabilities. Radio sets are readily transportable and may be operated from moving vehicles and aircraft or from fixed positions. No physical circuits are required to establish communication. Radio offers the fastest and most dependable method for long-range communication.

c. Limitations. Because radio equipment is complex, operator and repair and maintenance personnel require extensive individual specialized training. Likewise, since radio messages can be in-

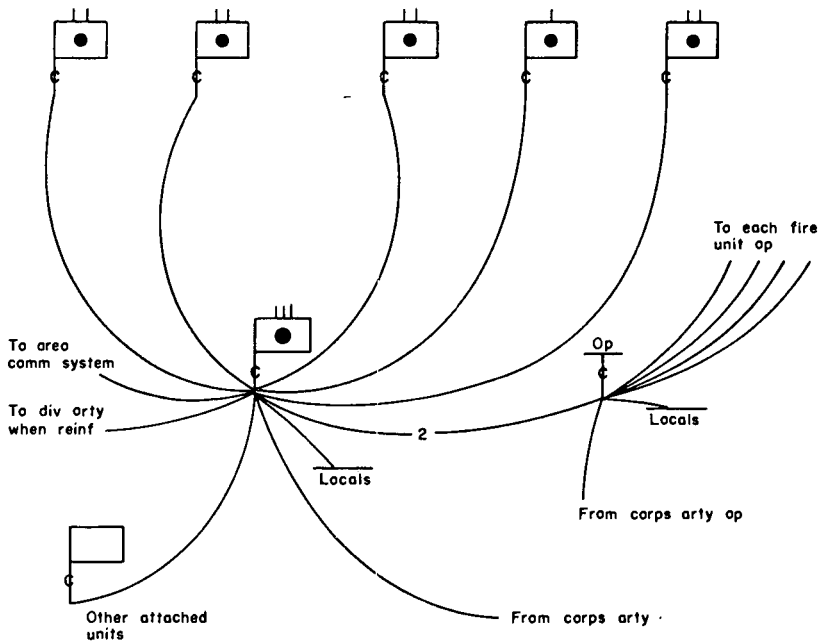


Figure 24. Field artillery group wire system.

tercepted by a determined enemy, encoding or enciphering and use of authentication systems are required to offset enemy interception capabilities. These countermeasures are time-consuming and delay handling of message traffic. Finally, radio is subject to enemy jamming and affords the enemy a means of locating radio transmitters and thereby command posts and other installations. Countermeasures to offset the jamming capabilities of an enemy are time-consuming to install and are unusable while the set is in movement.

d. Systems. For type radio systems employed in field artillery group, corps artillery, and army artillery, see figures 26, 27, and 28. For type radio communication employed in the division, see appropriate field manuals in the 6-series (app. I).

264. Air Alert Information

Corps air defense artillery units provide air alert information to corps units on the special purpose warning net. Division artillery receives and evaluates this information for divisional units. Warning to divisional units is made by division artillery on a similar warning net. For further details on air defense artillery, see appropriate field manuals in the 44-series.

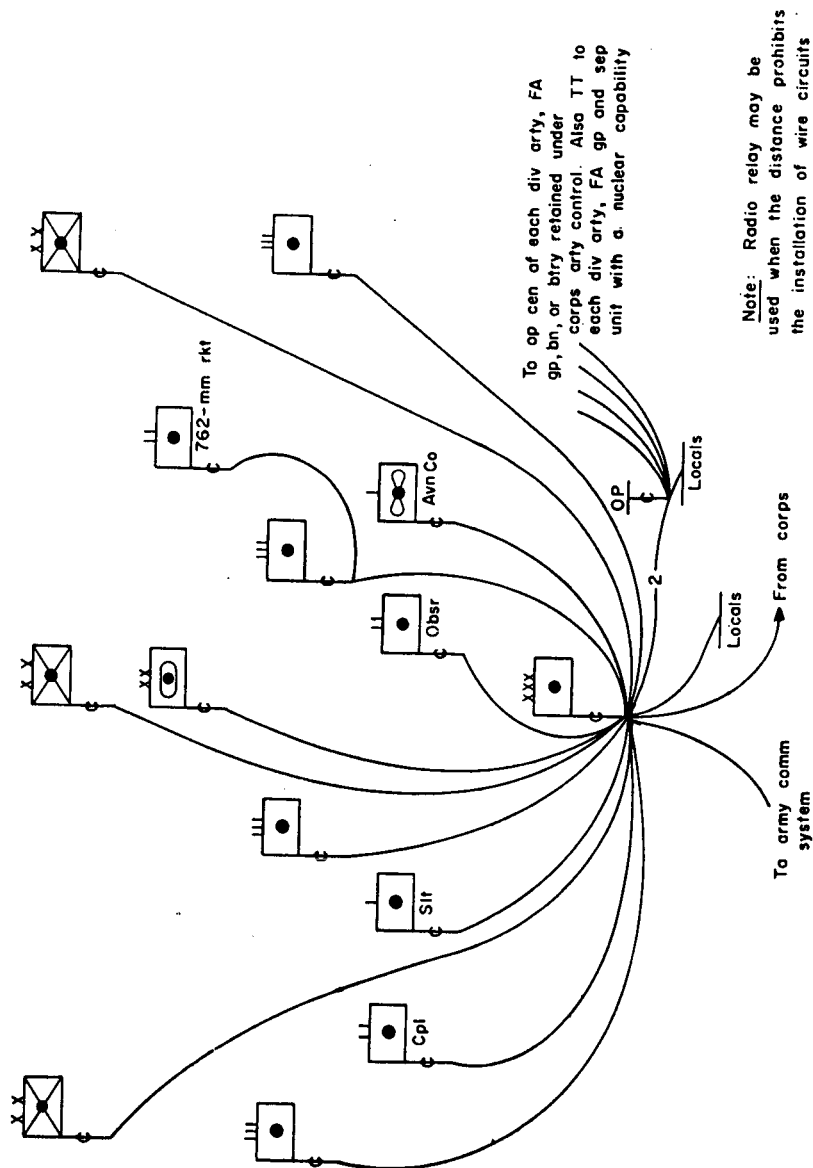
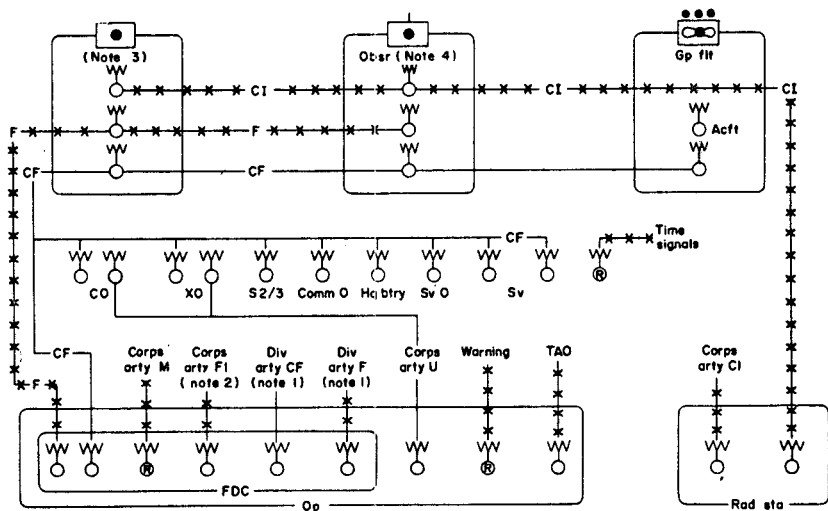


Figure 25. Corps artillery wire system.



Notes.

1. When atch or reinf.
2. Corps arty F2 when atch to div.
3. Atch FA fire unit.
4. When atch.

Legend

- C Command net
- F Fire direction net
- I Intelligence net
- M Met net
- Ⓡ Receiver only
- U Utility net
- TAO Tactical air abser net (TAF)
- FM net
- X-X AM net

Figure 26. Type radio system, field artillery group.

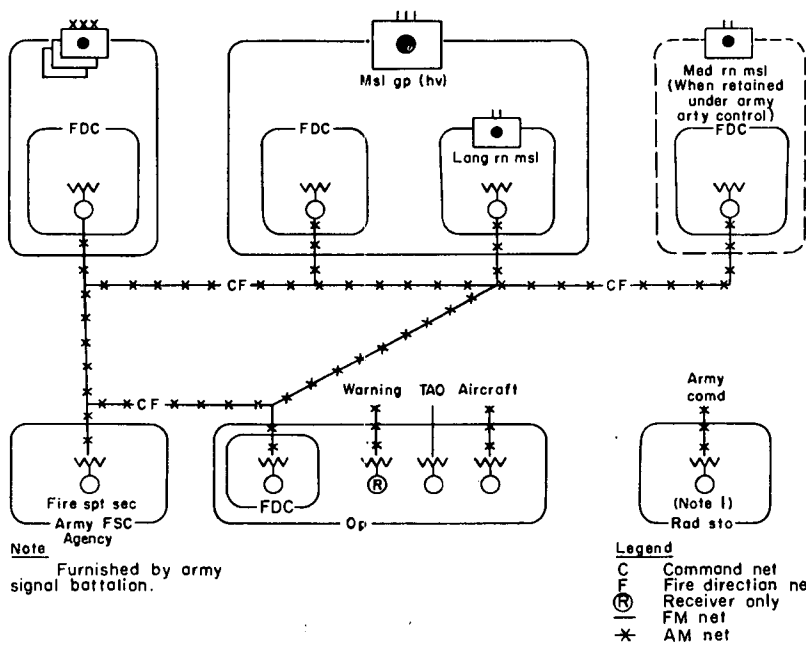


Figure 28. Type radio system, army artillery.

CHAPTER 15

AMMUNITION SUPPLY

265. General

The effectiveness of an ammunition supply system is measured by its ability to supply the required amount and type of serviceable ammunition to using troops when they need it. Class V supplies directly influence tactical operations and are, therefore, controlled by all commanders in the tactical chain of command. The ammunition supply system is designed to permit resupply quickly and informally. The ammunition supply system, known as the continuous refill system, is based on possession of ammunition by the using units of a fixed basic load of ammunition which will be replenished as used (FM 6-101, FM 9-6, FM 100-10, and FM 101-10).

266. Class V Procedures

a. Required Supply Rate. The required supply rate is the amount of ammunition for each type weapon, expressed in rounds per weapon per day, required to sustain operations of a designated force without restriction. Artillery commanders at battle group, division, corps, and army, in conjunction with the force G3 (S3) and G4 (S4), make recommendations to the force commander as to the quantity of artillery ammunition needed to support future tactical operations. These estimates should be based on the mission, experience data, factors in the theater, knowledge of the enemy capabilities, and the proposed plan of operation. The quantity of ammunition requested by each echelon is reviewed, evaluated, and consolidated at the next higher echelon. Final determination of the ammunition allocation is made at theater army level. Careful consideration must be given to the types and sizes of available artillery weapons and units, the proposed plan, the expected use of nuclear weapons, and the duration of the operation in order to arrive at an accurate required supply rate.

b. Available Supply Rate. The available supply rate is announced by the army commander for the period covered. This rate is based on allocations of credit from higher headquarters and the tactical requirements of the corps and other elements of the army. The corps commander will announce a detailed apportionment of artillery ammunition to the corps artillery units and

divisions of the corps, based on recommendations of the corps artillery commander. Ammunition is allocated at division level in a similar manner. The supply rate among units of the same type frequently varies with the mission, targets available, and plan of the supported force. Authority from the next higher commander is required for a unit to exceed its available supply rate. The available supply rate may be published in the administrative order of the force and paragraph 4 of the fire support plan annex to the force operation order or as a fragmentary order.

267. Maintenance of the Basic Load

a. A basic load of ammunition is a prescribed quantity of ammunition authorized to be in the possession of a unit. It is carried by the individuals and vehicles of a unit. All commanders must insure that units maintain their basic loads at the prescribed level. Failure to maintain the basic load will cause an unanticipated depletion of reserves of ammunition within the army, since ammunition issued initially or for replenishment of the basic load is considered as ammunition expended and is not included in the theater supply level. Hoarding above the basic load may impair mobility of units, cause ammunition to be abandoned and, in aggravated cases, deny commanders the opportunity to exploit tactical opportunities because of maldistribution.

b. Units arriving in the theater of operations less basic loads of ammunition may draw ammunition at any designated supply installation by presenting an authenticated ammunition requisition bearing the statement, "Initial issue quantities are within authorized allowances."

c. Units replenish their basic loads and draw ammunition for immediate consumption from designated ammunition supply points on presentation of an authenticated ammunition requisition bearing the statements "Required to replenish basic load (required for immediate consumption). Expenditures are within authorized available supply rate." The statement, "Required for immediate consumption," will be interpreted to mean that ammunition will be expended within 24 hours subsequent to withdrawal from the ammunition supply point. Replenishment of the basic load in an active situation may be made concurrent with, in anticipation of, or after expenditures. For example, an infantry division preparing to defend against an enemy attack may stockpile ammunition at weapon positions and draw ammunition from the ammunition supply point on the basis that it is required for immediate consumption.

d. The exact quantity of ammunition in the possession of a unit may temporarily exceed the basic load. A unit drawing ammuni-

tion on the basis that it is required for immediate consumption is in effect drawing ammunition in anticipation of a requirement. This temporary overage may be frequent and normal during sustained fighting. However, when it occurs, it will not be reported as an overage unless the overage is excessive and is held by the unit for a period in excess of 24 hours. Unit commanders must prevent temporary overages from becoming excessive or prolonged.

268. Nuclear Class V Procedures

a. In general, nuclear ammunition supply procedures parallel those for nonnuclear ammunition. Combined arms force commanders at each echelon will be authorized to expend a specific number of nuclear weapons during a stated period. The authorized number of nuclear weapons (identified by type of nuclear component and/or shell, warhead, or bomb) will be the nuclear ammunition available supply rate (ASR) for the period. The ASR for nonnuclear ammunition is expressed in rounds per weapon per day for a stated period. The stated periods for nuclear and nonnuclear ASR's may not be the same. Within the basic load of each unit, the percentages of nuclear and nonnuclear projectiles or warheads and the number and type(s) of nuclear components are specified by appropriate commander, dependent on the availability and expected extent of use of nuclear weapons. It is unlikely that all units of the same type will carry the same percentage of nuclear and nonnuclear ammunition, or the same number and type of nuclear components.

b. Corps and divisional units having a nuclear capability draw nuclear ammunition from the appropriate ammunition supply point or depot designated in the army administrative order.

c. Long-range missile battalions are retained under field army control and ordnance units for supplying all components are located to best support the delivery unit. If the long-range missile units are located in the forward area, ammunition will be drawn from forward supply points.

d. Nuclear ammunition supply must be carefully planned for artillery units with a nuclear capability. Changes in organization for combat and shifting of these units during an operation should be closely coordinated with higher headquarters to insure prompt, adequate nuclear ammunition supply throughout the operation.

269. Exceptional Situations

Occasionally, it may be necessary for a unit to obtain and *hold* ammunition in excess of its basic load. An example is an artillery unit supporting a force in a passage across a terrain obstacle. Un-

der such circumstances, army authorizes a specific quantity of ammunition in excess of basic load to be in possession of the unit for a stated period of time. The quantity of this authorized excess ammunition on hand is reported daily so that an accounting of the army tactical reserve may be made. These reports may be made to the army ammunition officer through regular command channels, or to the supply installation supporting the unit. The unit commander holding this authorized excess ammunition has the same responsibility for conserving, safeguarding, and *displacing* it as he has for his own basic load.

APPENDIX I

REFERENCES

AR 10-5	Department of the Army.
(C) AR 190-60	Physical Security of Army Atomic Weapons (U).
AR 220-5	Designation and Classification of Units.
AR 220-50	Regiments; General Provisions.
AR 220-60	Battalions; General Provisions.
AR 310-1	General Policies.
AR 320-50	Authorized Abbreviations.
AR 525-30	Army Missiles.
AR 525-50	Army Air Defense Operations.
SR 220-150-5	Assignment of Separate Nondivisional Battalions and Companies.
SR 320-5-1	Dictionary of United States Army Terms.
SR 525-45-1	Command Report (Reports Control Symbol CSGPO-28(R1)).
FM 3-5	Tactics and Techniques of Chemical, Biological, and Radiological Warfare.
FM 5-15	Field Fortifications.
FM 5-20-series	Camouflage.
FM 6-18	Mortar Battery, Infantry Division, Battle Group.
FM 6-21	Division Artillery, Infantry Division.
(S) FM 6-25	Field Artillery Missile Group (Heavy) (U)
(C) FM 6-30	Field Artillery Missile Battalion, Corporal (U).
(S) FM 6-30A	Field Artillery Missile Battalion, Corporal (U).
FM 6-40	Field Artillery Gunnery.
FM 6-50	4.2-Inch Mortar M30.
FM 6-60	The Field Artillery Rocket, 762-mm.
(S) FM 6-60A	The Field Artillery Rocket, 762-mm (Atomic) (U).
FM 6-61	Field Artillery Battalion, 762-mm Rocket.
(S) FM 6-61A	Field Artillery Battalion, 762-mm Rocket (U).
FM 6-96	280-mm Gun T131 on Carriage T72.
FM 6-101	The Field Artillery Battalion.
FM 6-115	The Field Artillery Searchlight Battery.

FM 6-120	The Field Artillery Observation Battalion and Batteries.
FM 6-135	Adjustment of Artillery Fire by the Combat Soldier.
FM 6-140	The Field Artillery Battery.
FM 6-160	Radar Set AN/MPQ-10.
FM 7-10	Rifle Company, Infantry Regiment.
FM 7-21	Headquarters and Headquarters Company, Infantry Division Battle Group.
FM 7-24	Communication in Infantry and Airborne Divisions.
FM 7-40	Infantry Regiment.
FM 7-100	The Infantry Division.
FM 8-10	Medical Service, Theater of Operations.
FM 9-5	Ordnance Service in the Field.
FM 9-6	Ordnance Ammunition Service in the Field.
FM 9-10	Ordnance Maintenance and General Supply in the Field.
FM 11-10	The Signal Battalion, Infantry Division.
FM 11-16	Signal Orders, Records, and Reports.
FM 11-151	Defense Against Electronic Jamming.
FM 17-1	Armor Operations; Small Units.
FM 17-34	Amphibious Tank and Tractor Battalions.
FM 17-35	Armored Cavalry Units, Armored and Infantry Divisions.
FM 17-70	Signal Communication in the Armored Division.
FM 17-100	The Armored Division and Combat Command.
FM 20-32	Employment of Land Mines.
FM 20-100	Army Aviation.
FM 21-5	Military Training.
FM 21-6	Techniques of Military Instruction.
FM 21-26	Map Reading.
FM 21-30	Military Symbols.
FM 21-40	Defense Against CBR Attack.
FM 22-5	Drills and Ceremonies.
FM 24-5	Signal Communications.
FM 25-10	Motor Transportation, Operations.
FM 30-5	Combat Intelligence.
FM 30-7	Combat Intelligence; Regiment, Combat Command, and Smaller Units.
(C) FM 31-5	Landing Operations on Hostile Shores (U).
FM 31-15	Operations Against Airborne Attack, Guerilla Action and Infiltration.

FM 31-21	Guerilla Warfare and Special Forces Operations.
FM 31-25	Desert Operations.
FM 31-50	Combat in Fortified Areas and Towns.
FM 31-60	River-Crossing Operations.
FM 31-70	Basic Cold Weather Manual.
FM 31-71	Northern Operations.
FM 31-72	Mountain Operations.
FM 44-1	Antiaircraft Artillery Employment.
FM 44-2	Light Antiaircraft Artillery (Automatic Weapons).
FM 44-3	Light Antiaircraft Artillery (Skysweeper).
FM 44-4	Medium and Heavy Antiaircraft Artillery.
FM 44-8	Antiaircraft Operations Center and Antiaircraft Artillery Information Service.
FM 55-37	Transportation Battalion, Infantry Division.
FM 57-20	Airborne Techniques for Divisional Units.
FM 57-30	Airborne Operations.
FM 60-5	Amphibious Operations Battalion in Assault Landings.
FM 60-30	Amphibious Operations; Embarkation and Ship Loading (Unit Loading Officer).
FM 72-20	Jungle Operations.
(S) FM 100-1	Field Service Regulations Doctrinal Guidance (U).
FM 100-5	Field Service Regulations; Operations.
FM 100-10	Field Service Regulations; Administration.
FM 100-11	Signal Communications Doctrine.
FM 100-15	Larger Units.
FM 101-1	The G1 Manual.
FM 101-5	Staff Officers' Field Manual; Staff Organization and Procedure.
FM 101-10	Staff Officers' Field Manual: Organization, Technical, and Logistical Data.
(S) FM 101-31	Staff Officers' Field Manual: Atomic Weapons Employment (U).
(S) FM 101-31A	Staff Officers' Field Manual: Atomic Weapons Employment (U).
FM 110-5	Joint Action; Armed Forces.
TM 6-200	Artillery Survey.
TM 6-242	Meteorology for Artillery.
TM 9-1901	Artillery Ammunition.
(C) TM 9-1907	Ballistic Data, Performance of Ammunition (U).
(C) TM 23-200	Capabilities of Atomic Weapons (U).

(C) TM 30-240	Soviet Projectile Identification Guide (U).
(S) TM 39-0-1	Numerical Index to Joint Special Weapons Publications (U).
TM 57-210	Air-Movement of Troops and Equipment.
DA Pam 39-1	Atomic Weapon Employment.
DA Pam 39-3	The Effects of Nuclear Weapons.
DA Pam 108-1	Index of Army Motion Pictures, Film Strips, Slides, and Phono-Recordings.
DA Pam 310-series	Military Publications Indexes.
TC 9-2	The Ordnance Class V Support System.

APPENDIX II

FORMS AND EXAMPLES

1. Form for Operation Order and Operation Plan (FM 101-5)

(Classification)

(Changes from oral orders, if any.)

Copy No. _____

Issuing headquarters

Place of issue (may be in code)

Date-time group (time of signature)

Message reference number

Operation order _____

(Type, serial number, and/or title.) (Note 1.)

References: (Maps, charts, and relevant documents.) (Note 2.)

Time zone. (Used throughout the order; if unnecessary, omit.)

Task organization. List here, when appropriate, the task subdivisions or tactical components which will comprise the command, together with the names and ranks of the commanders. When a task organization is not listed, this information is included in paragraph 3 or in an annex.

1. SITUATION. Such information of the general overall situation as may be essential for subordinates to understand the current situation.

a. Enemy forces. Composition, disposition, location, movements, estimated strengths, identifications, and capabilities.

b. Friendly forces. Pertinent information of own forces, other than those covered by the operation order, which may directly affect the action of a subordinate.

c. Attachments and detachments. When not shown under task organization, list here units attached to or detached from the issuing unit together with the times they are effective. When shown under task organization, list here an appropriate reference.

d. Assumptions. (This paragraph is applicable to operation plans only.) Assumptions used by the commander as a

(Classification)

(Classification)

basis for the plans; normally applicable only to higher planning echelons.

2. **MISSION.** A clear, concise statement of the task which is to be accomplished by the commander and its purpose.
3. **EXECUTION.** In the first subparagraph, give the concept of operation (note 2). In separate lettered subparagraphs, give the specific tasks of each element of the command charged with the execution of tactical duties including the organization for combat, if not already given under task organization. In the final subparagraph, titled "Coordinating instructions," give details of coordination and control measures applicable to the command as a whole and instructions applicable to two or more elements which are necessary for coordination or the general conduct of the operation, the repetition of which in the other subparagraphs of paragraph 3 would be cumbersome.
4. **ADMINISTRATION AND LOGISTICS.** Instructions concerning administrative matters including logistical arrangements for the conduct of the operation. These instructions are frequently included in an annex or separate document to which reference should be made.
5. **COMMAND AND SIGNAL.** Instructions concerning signal and command including reference to a standard plan or annex — rendezvous, location, and movements of commander and command posts, statement of command relationship, axis of signal communication, recognition and identification instructions, electronic policy, code words, code names, and liaison, as appropriate.

Acknowledgement instructions.

Commander

Annexes

Distribution

Authentication

- Notes.
1. The type of operation order is usually indicated in combined or joint operations. Within a single service, the type of operation order is normally omitted. When required, a code title may also be included.
 2. For information which is normally included in the concept of operation, see paragraph 230.

(Classification)

2. Suggested Form for Fire Support Plan Annex To Force Operation Order (Division)

The following form is adapted from the five paragraph operation order and is applicable, with appropriate changes in wording, to fire support plans at other echelons. Normally do not repeat instructions or items of information contained in the division standing operating procedure. Do not repeat the operation order or current administrative order except on matters pertaining to division missions, concept of operations, and fire support.

(Classification)

Copy No. _____

Issuing headquarters

Place of issue (may be in code)

Date-time group (time of signature)

Message reference number

Annex _____ (fire support plan) to operation order _____.

References: Maps, charts, or other relevant documents.

Time zone. (Used when the operation will cross a time zone; if unnecessary, omit.)

1. SITUATION. State in a, b, and c below so much of the general situation as is deemed essential for commanders and staffs of fire support units to know concerning—

Enemy capabilities which can affect fire support agencies.

Fire support units which will support the division or reinforce fires of division units.

Fire support units which are attached to, or detached from, the division.

- a. Enemy forces. Refer to the current intelligence publication covering the enemy situation. If pertinent, refer to any particular enemy capability, such as his air capability, which may have a definite impact on fire support agencies. (Source: Division or division artillery intelligence representative.)
- b. Friendly forces. State so much of the corps mission as is required for coordinated action by recipients of the fire support plan. Then list the unit(s) furnishing air support to corps or army. Follow with a statement of fire support units, not organic or attached, on which the division may call directly for fire support (e.g., corps "GS, reinf" or

(Classification)

(Classification)

“reinf” FA (including missile) battalions or groups, or naval units in GS or DS).

(Source: G3 air or division artillery operations representative.)

- c. Attachments and detachments. List fire support units now attached, or which are attached or detached by the operation order, together with the effective time and date.

(Source: G3 air or division artillery operations representative.)

2. MISSION. State the mission of the division.

(Source: G3 air.)

3. EXECUTION. In separate lettered subparagraphs, give a brief concept of the operation, then indicate fire support to be rendered by available fire support agencies, such as air, artillery, and naval gunfire. When available, nuclear, chemical, biological, and radiological weapons, although not separate fire support agencies, are also listed separately to indicate the importance attached to their support. List fire support agencies in alphabetical order.

- a. Concept of operation of the division. State briefly the concept of operation of the division with emphasis on fire support. Include priorities of fire support, whether they are for the duration of the operation or for a specified number of hours. In the latter case, specify the limiting hours. List priorities separately for air, artillery, and naval gunfire, unless they are all for the duration of the operation without qualification. (Source: G3, G3 air, or FSC.)

b. Tactical air support.

(1) General.

(a) General information on tactical air support available at corps or army.

(b) Commander's desires on use of tactical air support, other than that specifically allocated, which may become available.

(2) Allocations.

(a) By higher headquarters (and not further allocated to subordinate units).

(Classification)

(Classification)

- (b) To subordinate units (tactical air support, or tactical air control agencies such as forward tactical air controllers (FAC) and tactical air control teams (ACT)).
 - (3) Miscellaneous. Miscellaneous instructions and information concerning tactical air support or the method and time of requesting preplanned tactical air missions when such instructions are not covered by standing operating procedure (SOP) or when they constitute a change to the standing operating procedure. The last item is a reference to the tactical air fire plan appendix. (Source: G3 air.)
- c. Artillery support. This subparagraph contains information for, and instructions to, artillery units organic, attached, or under the fire control of division artillery. (For example, corps artillery units with a mission of "reinf 20th Inf Div Arty" are under the fire control of 20th Inf Div Arty, but units with the mission of "GS, reinf 20th Inf Div Arty" are not under the fire control of 20th Inf Div Arty.)
- (1) General. Give information of the echelons of artillery such as corps and division artillery, which will support the operation; information of a preparation, if any, and its duration; and any restrictions placed on the use of higher echelon artillery with a primary mission of reinforcing division artillery.
 - (2) Artillery task organization. This subparagraph may be used when specific batteries are placed under division artillery control and/or are to operate under control of an artillery headquarters other than that to which assigned. Under each headquarters will appear the battalions, batteries, or platoons comprising the artillery organization. This subparagraph is for use within a division, having organic one light battalion and one rocket/howitzer battalion, to reflect the rearrangement of elements to support a maneuver. If this subparagraph is not used to show the artillery task organization, it is used for organization for combat, and attachments and detachments within the artillery of

(Classification)

(Classification)

the force are shown, as well as assignment of missions to each element.

(3) Organization for combat.

(a) Division artillery. Give organizations for combat of artillery units organic or attached to the command. A mission or mission type order must be assigned to each. List field artillery groups attached to the division and show elements thereof. List division artillery units, organic or attached, in numerical sequence by regimental number. When units to be listed are from the same regiment, battalions are listed in numerical sequence and batteries alphabetically. Batteries assigned a separate tactical mission under direct division artillery control are listed separately in alphabetical sequence immediately following the parent battalion.

(b) Reinforcing artillery. (Use numerical designation here if only one group or battalion.) Give instructions to any artillery units, not organic or attached, which have a mission of "reinforcing" division artillery.

(4) Miscellaneous. Give miscellaneous instructions and information for artillery units, such as instructions on scheduling of fires, and position areas and zones of fire (usually reference to an appendix). The last item is a reference to the artillery fire plan.

(Source: Artillery operations representative.)

d. Atomic support. (When applicable.) This subparagraph is similar to the air support subparagraph and gives the general plan of employment and, if appropriate, allocations of units and weapons. The last item titled "Miscellaneous" is a reference to the nuclear fire plan.

(Source: G3 and artillery operations representative.)

e. Chemical, biological, and radiological support. (When applicable.) (See d above on nuclear weapons.) There may be separate fire plans attached as appendixes if extensive use of chemical, biological, and radiological weapons is made; otherwise, the detailed use of special purpose weap-

(Classification)

(Classification)

ons for the operation is contained in the air fire plan, artillery fire plan, or naval gunfire plan.

(Source: G3 and chemical officer.)

- f. Naval support. (When applicable.) This subparagraph is similar to the air support subparagraph, and gives general information, allocation of support from higher headquarters, plus suballocations of fire support and of control personnel to lower echelons. These are followed by miscellaneous instructions. The last item under "miscellaneous" is a reference to the naval gunfire plan.

(Source: NGO.)

- g. Coordinating instructions. This is the last subparagraph in paragraph 3. Its actual letter designation depends on the number of fire support agencies available.

- (1) Give instructions applicable to two or more fire support agencies, such as procedures for marking of air strikes by ground fires, restrictions on firing by ground or naval weapons while friendly aircraft are conducting air strikes, procedures for coordinating flak suppression fires, and the time that fire plans must be submitted to the agency responsible for fire support coordination.
 - (2) Miscellaneous troop safety instructions, such as permissible exposure to radiation, protection during nuclear strikes, and notification to subordinate units of impending use of nuclear weapons by friendly forces, are also included when applicable.
 - (3) Items of general interest to all units, such as the location of the bomblines, may be included.
- (Source: G3, G3 air, and FSC.)

4. ADMINISTRATION AND LOGISTICS.

- a. Refer to the current administrative order.
- b. List any special administrative instructions applicable to this operation, and of concern to fire support agencies, such as a directive to dump ammunition in excess of basic load on position.
- c. State only items which are of interest to fire support agencies which require special emphasis, or which have changed

(Classification)

(Classification)

since the administrative order was published. These may include the location of the division ammunition office (DAO) and appropriate available supply rates.

(Source: G3, G4, and division artillery operations representative.)

5. COMMAND AND SIGNAL.

- a. Signal. Refer to the current signal annex and index to the signal operations instructions (SOI), if appropriate.

(Source: G3 air, division artillery operations representative, or signal officer.)

- b. Command. State locations of the agency(s) responsible for fire support coordination, if other than that prescribed by SOP. Their locations may be shown, if desired, even when located as given in the SOP.

(Source: G3 air, division artillery operations representative, or units.)

Acknowledgements instructions.

FOR THE COMMANDER (if applicable) :

Signature (or typed name of commanding general or chief of staff)

Appendixes

Distribution

Authentication (on copies not signed)

(Classification)

3. Suggested Form for Target Analysis

The following form for target analysis insures a logical and orderly examination of all the factors to determine the most effective means of attacking the target.

(Classification)

1. SITUATION AND COURSE OF ACTION :

- a. Situation of opposing forces.

(1) Enemy situation—include information that will aid in target analysis.

(Classification)

(Classification)

- (2) Friendly situation—include information that will aid in attacking the target.
- b. Target characteristics.
 - (1) Target description—include type (personnel, materiel, terrain features), numbers of personnel, quantity of materiel, and activity.
 - (2) Vulnerability—include type and amount of cover, type of materiel, type of construction, mobility, and density of personnel and materiel.
 - (3) Physical location and altitude—include grid reference and altitude of target, location with respect to supported unit and terrain features, and proximity to friendly troops.
 - (4) Accuracy of location—give estimated accuracy of target location.
 - (5) Size and shape of target area—give the dimensions and shape of the target area, and distribution of personnel and materiel within the area.
 - (6) Terrain and weather—include brief analysis of weather and terrain in the target area; include any terrain features affecting the means and methods of attack.
- c. Target capabilities—discuss the capabilities of the target, as they affect the accomplishment of the mission of the supported unit; if a terrain feature(s), show how it affects enemy capabilities.
- d. Other factors—list and discuss any or all of the following factors and any additional ones that will affect the choice of firepower, delivery means, and method of attack:
 - (1) Urgency of attack—usually determined by the type of target (static or fleeting) and its capabilities.
 - (2) Enemy countermeasures—state ability of the enemy to minimize the effects of firepower; consider capabilities of the enemy to prevent effective delivery and to bring countermeasures against delivery means after attack.
 - (3) Enemy discipline and morale—state factors that will aid in determining the amount of firepower required to neutralize personnel targets.

(Classification)

(Classification)

- (4) Creation of obstacles—discuss any considerations concerning desirability or undesirability of creating obstacles by attacking the target.
- (5) Civilian casualties—show approximate number of civilians in the target area and the estimated effect of causing excessive casualties.
- (6) Surprise—discuss any particular methods desired to obtain surprise, including least expected time of attack, means of delivery, and restrictions on registration.
- e. Means of attack—note all available types of firepower and required amounts with which it would be practicable to attack the target; show most practicable delivery means in each case.

2. ANALYSIS OF MEANS OF ATTACK. Discuss the application of each means of attack on the target characteristics (par. 1b), target capabilities (par. 1c), and other factors (par. 1d). For each means of attack, include—

- a. Location of center of impact which will obtain greatest effect; include optimum height of burst for nuclear weapons.
- b. Effect of available supply rate.
- c. Estimate of enemy casualties and materiel damage.
- d. Estimate of civilian casualties.
- e. Estimate of obstacles created.
- f. Precautions required for friendly troops.

Note. The analysis of each of the means of attack may be shown in an annex.

3. COMPARISON OF MEANS OF ATTACK. Summarize the outstanding advantages and disadvantages of each means of attack and determine which offers the most promise of success.

4. DECISION OR RECOMMENDATION.

- a. Type and amount of firepower and delivery means.
- b. Unit(s) to fire.
- c. Grid reference and altitude of desired center of impact; height of burst when applicable.
- d. Time of attack.
- e. Safety precautions, special coordination, and warnings required.
- f. Method for determining post attack analysis.

(Classification)

4. Suggested Procedure for Nuclear Weapons Target Analysis

The following procedure insures an orderly method for determining the most effective nuclear weapons for attack of a target:

(Classification)

1. DETERMINE RADIUS OF TARGET (R_T).

- a. If one dimension is more than twice the other dimension, divide into two or more targets.
- b. Formulas: rectangle $0.564 \sqrt{a \times b}$; ellipse $0.5 \sqrt{a \times b}$; triangle $0.398 \sqrt{h \times b}$.

2. DETERMINE A TRIAL CIRCULAR ERROR PROBABILITY (CEP).

- a. Check all delivery means available and compute each CEP.
- b. Check predicted fires and conversion factors.
- c. Select a trial CEP which includes those delivery means to be considered.

3. DETERMINE MINIMUM REQUIRED RADIUS OF DAMAGE (R_D).

- a. Use applicable rapid damage chart or nomograph based on fixed 90 percent probability.
- b. If probability is other than 90 percent, standard P(f) nomographs (FM 101-31A) must be used.

4. DETERMINE MINIMUM ESSENTIAL YIELD OR MINIMUM STOCKPILE WEAPON AND YIELD.

- a. Check criteria (immediate or delayed casualties; severe or moderate damage).
- b. Check casualty radii (blast, nuclear); for damage, check only blast radii.

5. SELECT TENTATIVE WEAPON AND DELIVERY MEANS.

- a. Select an available delivery means.
- b. Select an allocated weapon that meets the minimum essential yield.

6. DETERMINE MINIMUM HEIGHT OF BURST (H_B). Insure that the minimum H_B meets the commander's requirement (degree of assurance) for no significant fallout contamination.

(Classification)

(Classification)

7. CHECK TROOP SAFETY AND CONTINGENT REQUIREMENTS.

- a. Check compliance with commander's requirements for each weapon to be used.
- b. Check all criteria; blast, nuclear radiation, and thermal radiation.
- c. Compute offset, if necessary. (Other technical courses of action may be resorted to as indicated in chapter 11, FM 101-31.)

8. DETERMINE ACTUAL FRACTIONAL PROBABILITY ($P(f)$).

- a. Use actual CEP of selected delivery means and actual (R_D) of weapon.
- b. Use appropriate variability.
- c. If desired ground zero (DGZ) is offset for troop safety or other reasons, use d (amount that DGZ is offset from target centers).
- d. Use applicable rapid damage chart or nomograph, based on a fixed 90 percent probability.
- e. If probability is other than 90 percent, standard ($P(f)$) nomographs (FM 101-31A) must be used.

9. RECOMMENDATIONS. List recommendations as to—

- a. Weapon(s).
- b. Delivery means.
- c. Height(s) of burst.
- d. Desired ground zero(s).
- e. Time between bursts (if required).
- f. Troop safety precautions.

(Classification)

5. Suggested Form for Corps or Division Artillery Intelligence Bulletin

(Classification)

Issuing section and headquarters
Place
Time and date

Artillery Intelligence Bulletin No. _____

(Classification)

(Classification)

1. **GENERAL.** Discuss frontline progress, latest locations, and friendly activities of particular interest to artillery.

2. **ENEMY SITUATION**

- a. **Artillery.** Include changes in dispositions, compositions, and strengths of hostile artillery since the last bulletin. Discuss briefly the composition of each group identified by such sources as sound and flash ranging, observed missions, and shelling reports. Include newly occupied or suspect areas to focus observation into these areas.
- b. **Infantry.** Give any information of interest, such as new locations, extracted from bulletins of higher headquarters, from G2 reports, and from own sources.
- c. **Armor.** Similar to b above.
- d. **Air.** State any change in enemy air capabilities.
- e. **Nuclear.** State any change in enemy nuclear delivery capabilities.
- f. **Other elements.** Similar to b above.

3. **ENEMY OPERATIONS.**

- a. **Artillery.** Review the time, place, and quantity of shelling received in the areas occupied by division and corps troops, with specific reference to fire placed on friendly artillery. Mention noteworthy changes in the quantity of enemy shelling, to include comparison of the day and night volumes, increase or decrease of the caliber of shells employed, new areas attacked and old target areas abandoned, and type of targets receiving special attention.
- b. **Infantry.** Give any information of interest, such as counter-attacks, extracts from bulletins of higher headquarters, from G2 reports, and from own sources.
- c. **Armor.** Similar to b above.
- d. **Air.** Summarize enemy air activities.
- e. **Nuclear.** Summarize enemy's employment of nuclear weapons.
- f. **Other elements.** Similar to b above.

4. **MISCELLANEOUS.**

- a. A statement of the weather conditions is published daily.

(Classification)

(Classification)

- b. Review effect of outstanding fire missions with credit to units firing.
- c. Give information, as necessary, regarding maps and photographs.
- d. Describe new developments in the technical and tactical aspects of the hostile artillery, which are of definite interest to all echelons of artillery.

5. TARGET LOCATIONS.

- a. Hostile battery (mortar) locations. Give additions and deletions to the current hostile battery (mortar) list.
- b. General target locations. Give additions and deletions to the current general target list.

Signature

(Classification)

6. Suggested Form for Army or Theater Army Artillery Information Bulletin

(Classification)

Headquarters
Place
Time and date

Artillery Information Bulletin No. _____

TABLE OF CONTENTS. List the title of each section and article, security classification, and page number.

INTRODUCTION. Include any pertinent remarks desired by the artillery commander (officer).

Section I. ARTILLERY PERSONNEL AND ORGANIZATION

Include articles concerning—

- 1. New arrivals in the artillery.
- 2. Lists of staff members and commanders of artillery units.
- 3. Changes in tables of organization and equipment.
- 4. Other personnel or organizational information.

(Classification)

Section II. OPERATIONAL PROCEDURE

Include articles concerning—

1. Any changes in artillery doctrine.
2. Uses of various types of photographs.
3. Employment of field artillery searchlights.
4. Lessons learned in previous campaigns.
5. Various methods of attack of targets.
6. Meteorological data.
7. Sun azimuth tables.
8. Successful improvisations.
9. Other operational procedures.

Section III. INTELLIGENCE

Include articles concerning—

1. Prisoner of war interrogation.
2. Enemy measures against friendly methods of attack.
3. Enemy methods of fire.
4. Enemy employment of nuclear weapons.
5. Enemy tactical ruses.
6. Comparison of hostile and friendly artillery methods, equipment, etc.
7. Enemy organization.
8. Enemy counterintelligence measures.
9. Other intelligence matters.

Section IV. MATERIEL, SUPPLY, AND EQUIPMENT

Include articles concerning—

1. Test firing against enemy materiel.
2. Characteristics of new weapons and fuzes.
3. Comparative armor penetration for various weapons.
4. Ammunition expenditures.
5. Other items of interest pertaining to materiel and ammunition.

(Classification)

Section V.

MISCELLANEOUS ARTICLES OF GENERAL INTEREST

Include articles concerning—

1. Lessons learned in other theaters.
2. Operations of particular units.
3. Other matters of general interest.

Note. Any charts, photographs, or illustrations desired or essential for clear understanding of any articles are included.

Signature

Annexes
Distribution
Authentication

(Classification)

7. Suggested Form for Artillery Periodic Intelligence Report

(Classification)

Copy No. _____
Issuing unit _____
Place of issue _____
Date-time group (time of issue) _____

PERIODIC INTELLIGENCE REPORT NO. _____

Period covered: (date and time to date and time)

Maps: (Those needed for an understanding of the report.)

1. ENEMY SITUATION AT END OF PERIOD.

- a. Enemy frontline (or nearest elements). Location and nature.
- b. Organization of position. Trenches, emplacements, observation posts, command posts, obstacles, etc.
- c. Artillery and mortars. (Care must be taken that statements regarding the hostile artillery are essentially true and are not unwarranted assumptions.)
 - (1) New locations, types, and calibers (or sizes), including newly occupied or suspect areas.
 - (2) Estimated combat efficiency (strength, degree of training, morale, and other pertinent factors).

(Classification)

(Classification)

- (3) Composition is discussed briefly, including designation of units and the source of information, such as sound and flash ranging, observed missions, and shelling reports. (May be submitted as an annex to the report.)
- d. Other targets. Any other targets located, such as:
 - (1) Reserves and other forces.
 - (2) Supply establishments and routes, bridges, and bypasses.
- 2. ENEMY OPERATIONS DURING PERIOD.
 - a. General summary. Artillery action of enemy forces as a whole.
 - b. Artillery operations.
 - (1) Reports of shelling to include the time, place, and quantity of shelling received in the areas occupied by division and corps troops, with specific reference to counterbattery fire placed on friendly artillery. Mention noteworthy changes in the quantity of hostile shelling, to include comparison of the day and night volumes, increase or decrease of the caliber shells employed, new areas attacked and old target areas abandoned, and type of targets receiving special attention.
 - (2) Shifts in hostile artillery areas.
 - (3) Other pertinent enemy actions.
 - c. Operation of component elements. (Derived from artillery sources.)
 - (1) Air defense artillery.
 - (2) Armor.
 - (3) Aviation.
 - (4) Engineers.
 - (5) Infantry.
 - (6) Employment of nuclear weapons.
 - d. Miscellaneous. Enemy activities, movements, or changes since last report, not conveniently included in b and c above.
- 3. OTHER INTELLIGENCE FACTORS.
 - a. Estimated enemy casualties caused by artillery fire and prisoners captured by the artillery troops.

(Classification)

(Classification)

- b. Morale.
 - c. Terrain.
 - d. Supply and equipment.
 - e. Enemy's probable knowledge of our artillery situation—observation (evidence of employment of sound and flash ranging), reconnaissance, prisoners and documents lost by us, civilians, etc.
 - f. Enemy counterintelligence measures. (Use of concealment, smoke, radio and radar jamming, deception, ruses, etc.)
 - g. Weather, visibility, and meteorological conditions.
 - h. Any enemy intelligence not specifically covered elsewhere in this report.
4. COUNTERINTELLIGENCE. Brief résumé of enemy counterintelligence activities derived from artillery sources.
- a. Espionage.
 - b. Sabotage.
 - c. Propaganda and rumors.
 - d. Miscellaneous.
5. ENEMY CAPABILITIES. (This paragraph is particularly applicable to the S2 of corps artillery.) A discussion of each course of action open to the enemy that may interfere with the accomplishment of our artillery mission. To assist the G2, the discussion of courses of action open to the enemy artillery should include the capabilities of delivery of nuclear and nonnuclear fires on all components of the force. For each enemy capability, the effect of time, terrain, general position areas of hostile artillery, ammunition supply, and other factors in the situation should be evaluated. The earliest estimated time at which the enemy can put each course of action into effect should be stated. When applicable, the possible result of the enemy's adoption of any capability should be included.

Signature

Annexes
Distribution
Authentication

(Classification)

8. Example of Target Summary

The form suggested for the target summary is divided into two parts, (1) a hostile battery (mortar) list, and (2) a general target list. This first part of the form can be published as a hostile battery (mortar) list. If desired, the recommended priority for each target may be given.

(Classification)

S2 section, Hq I Corps Artillery
FORT SILL, OKLAHOMA
7 March _____

TARGET SUMMARY NR 8

This summary supersedes all previous target summaries and hostile battery lists published by this headquarters.

1. HOSTILE BATTERY LIST

a. Confirmed.

<u>Grid square</u>	<u>Name or conc nr</u>	<u>Grid reference</u>	<u>Alt</u>	<u>Accuracy</u>	<u>Description</u>	<u>Source</u>
3489	CAC	34928948	300	50	1 railway gun	PI, sdrng
3697	CDC	36909732	400	100	1 ?	Sdrng
3698	CFC	36249862	350	50	4 how, probably 105-mm, 200-yd front, in line, facing SW, well dug in	PI, flrng
3799	CGC	37089920	250	50	4 hv ADA	PI, TAF
3892	BBC	38769222	350	100	2 ?	Sdrng
4391	BMC	43989196	400	50	4 lt wpn	FO, 1st How Bn, 27th Arty
4396	CVC	43349670	300	50	1 gun, probably 155-mm, facing SE, dug in	PI, Z
4489	CPC	44588910	95	100	2 hv wpn	Flrng
4490	BQC	44189014	295	10	3 med how	PI, Z

(Classification)

(Classification)

<u>Grid square</u>	<u>Name or conc nr</u>	<u>Grid reference</u>	<u>Alt</u>	<u>Accuracy</u>	<u>Description</u>	<u>Source</u>
4495	BXC	44709508	285	50	3 lt wpn	OP, 5th FA Bn, 19th Arty
4496	CLC	44069628	185	100	6 lt wpn	Flrng, aobsr

b. Suspect.

<u>Grid square</u>	<u>Name or conc nr</u>	<u>Grid reference</u>	<u>Alt</u>	<u>Accuracy</u>	<u>Description</u>	<u>Source</u>
3696	CU	36919692	---	200	4 med wpn	TAF
3798	CY	37389830	---	250	3 ?	POW
4390	CM	43669068	---	150	2 launcher	POW
4489	CR	44328966	---	300	3 SP wpn	Civ rept
4590	DA	45659055	---	50	Dummy (4 guns)	PI

2. GENERAL TARGET LIST

a. Confirmed.

<u>Grid square</u>	<u>Name or conc nr</u>	<u>Grid reference</u>	<u>Alt</u>	<u>Accuracy</u>	<u>Description</u>	<u>Source</u>
3490	EE22	34129060	320	100	CP	TAF, PI
3696	AB100	36109686	240	50	Airstrip	Aobsr
3699	EE37	36829908	300	100	Class III dump, 200-yd long, facing E	POW, PI, civ rept
4490	EE41	44229060	300	100	Veh park, in trees, 100-yd radius	Flrng, PI
4489	AC125	44308946	90	50	SP wpn, veh actv	FO, 3d FA Bn, 9th Arty, flrng

b. Suspect.

<u>Grid square</u>	<u>Name or conc nr</u>	<u>Grid reference</u>	<u>Alt</u>	<u>Accuracy</u>	<u>Description</u>	<u>Source</u>
4391	AD66	43229138	---	100	Possible assy area, in trees, considerable actv	Aobsr, TAF
4495	EE98	44909520	---	100	1 slt	Flrng, POW
4391	E101	43089128	---	50	OP	PI, POW

(Classification)

(Classification)

J. J. BLACK
S2

Distribution

(Classification)

9. Example of Artillery Annex to a Corps Standing Operating Procedure

Note. The SOP is published in the form that is most effective for the command. Regardless of form, the SOP is published by authority of the commander (it is a combat order in its own right) and carries the same weight as other orders in instructions. Although an SOP is based on the several field manuals, it does not repeat material specifically treated in the manuals. This example is for illustrative purposes only.

(Classification)

Copy No. _____
I Corps
FORT SILL, OKLAHOMA
15 March _____

Annex B (I Corps Artillery SOP) to SOP, I Corps

Section I. GENERAL

1. REFERENCE. SOP I Corps.
2. APPLICABILITY. Artillery with I Corps.
3. PURPOSE. This SOP standardizes normal procedures; it applies unless otherwise prescribed.
4. UNIT PROCEDURE. Subordinate unit issues SOP to conform.
5. DEFINITIONS.
 - a. Field artillery—All units assigned a field artillery tactical mission.
 - b. All available artillery—All field artillery except that engaged in firing a close support mission.
 - c. Close support mission—A fire mission requested by or delivered for a unit on a target that may immediately affect the supported unit.

(Classification)

Section II. PERSONNEL AND ADMINISTRATION

(As a matter of convenience for subordinate units, corps artillery might extract items from corps SOP relative to replacements, decorations, awards, leaves, promotions, reports, morale activities, and other pertinent subjects.)

Section III. INTELLIGENCE

6. OBSERVATION. 0-0 line prescribed when appropriate by corps artillery.

a. Ground OP.

(1) Initially, minimum of one per corps field artillery battalion.

(2) Area of responsibility, initially, is same as zone of fire.

b. Air (par. 16).

7. CONDITION OF AIR RAID WARNING. As announced by air force (par. 17).

8. REPORTS.

a. Visibility.

(1) Report of visibility will indicate—

(a) Location of OP.

(b) Primary area of responsibility.

(c) Other designated areas of responsibility.

(d) Dead space.

(e) Area within limits of effective observation.

(2) All OP's submit report by telephone or radio immediately on occupancy.

(3) Submit visibility diagram as soon as practicable.

b. Shelling report.

(1) Submit promptly by most expeditious means.

(2) Forward fragments by most expeditious means.

(3) Send reports and fragments through artillery channels to corps artillery.

(4) Areas of responsibility as established in corps SOP.

c. Tactical employment of nuclear weapons. (Extract from corps SOP for emphasis.) By fastest practicable means

(Classification)

forward information indicating enemy capabilities for tactical employment of nuclear weapons, such as:

- (1) Withdrawal of enemy frontline units.
- (2) Security detachment protecting movement of materiel.
- (3) Location of enemy weapons capable of delivering nuclear missiles, projectiles, or bombs.
- (4) Enemy training in nuclear warfare.

Section IV. OPERATIONS

9. FIRE CAPABILITIES.

a. Division artillery.

- (1) Report to corps artillery immediately the grid reference and azimuth of center of zone of fire of all cannon batteries.
- (2) Report the grid reference of firing position of missile battery.
- (3) When practicable, follow initial report with fire capabilities overlay indicating—
 - (a) Grid reference of each cannon battery and each firing position for missile battery.
 - (b) Minimum and maximum range of each cannon battery.
 - (c) Lateral limits of each cannon battery.
 - (d) Areas in which specific units cannot fire.

b. Corps field artillery battalions.

- (1) Report immediately through artillery channels to corps artillery the grid reference and azimuth of center of zone of fire of each cannon battery and firing positions of each missile battery.
- (2) When practicable, follow initial report with fire capabilities overlay indicating for each battery the information in a (3) above.

10. CONCENTRATION AND TARGET DESIGNATION

- a. A system of designating concentrations is established to prevent duplication and to indicate the planning source. Corps prescribes the use of a two-letter prefix in designating concentrations. Corps assigns the first letter indi-

(Classification)

(Classification)

cating the division and prescribes the manner in which the second letter will indicate the battle group, unit, installation, or other planning source.

- b. Within the corps, a letter is assigned to each division with which to designate division concentrations. Corps units other than divisions are assigned two letters with which to designate their concentrations. Corps unit letter designations are as follows:

<u>Unit</u>	<u>Prefix</u>
1st Infantry Division -----	A
2d Infantry Division -----	B
3d Infantry Division -----	C
4th Armored Division -----	D
Corps artillery FDC -----	EE

- c. Within the infantry divisions, the divisional unit letter designations will use the first letter assigned by corps and will be as follows:

<u>Unit</u>	<u>Prefix</u>
1st Infantry Division -----	A
2d Battle Group, 15th Infantry -----	AA
3d Battle Group, 19th Infantry -----	AB
1st Battle Group, 20th Infantry -----	AC
1st Battle Group, 23d Infantry -----	AD
2d Battle Group, 25th Infantry -----	AE
1st Howitzer Battalion, 17th Arty ----	AF
Battery A -----	AG
Battery B -----	AH
Battery C -----	AJ
Battery D -----	AK
Battery E -----	AL
2d FA Battalion, 18th Arty -----	AM
Battery A -----	AN
Battery B -----	AP
Battery C -----	AR
Battery D -----	AS
Division artillery FDC -----	AT
Air -----	AW
Naval -----	AX
Attached units -----	AY, AZ

(Classification)

(Classification)

- d. Within the armored divisions, the divisional unit letter designations will use the first letter assigned by corps and will be as follows:

<u>Unit</u>	<u>Prefix</u>
(4th Armored Division -----	D)
7th Howitzer Battalion, 13th Arty ---	DA
9th Howitzer Battalion, 14th Arty ---	DB
11th Howitzer Battalion, 15th Arty ---	DC
12th FA Battalion, 12th Arty -----	DD
Battery A -----	DE
Battery B -----	DF
Battery C -----	DG
Battery D -----	DH
Division Artillery FDC -----	DJ
Air -----	DL
Naval -----	DM
Attached Units -----	DN, NP, etc.

Note. The letters I, O, Q, U, and V are omitted to avoid possible confusion.

- e. Groups of fires will be designated the same as concentrations are designated, except that the numeral will be placed between the letters. For example, the first group of fires designated by the 1st Howitzer Battalion, 17th Artillery, will be designated A1F.
- f. Hostile artillery suspect locations are identified in the order located by the use of letters: AA (1st location), AC (3d location), BA (27th location). When the artillery location is confirmed, the letter C is added: AAC, ACC, BAC.
- g. Hostile mortar suspect locations are identified by the use of the letter M plus a second and third letter assigned alphabetically as the locations are identified: MAA (1st location), MAB (2d location), MBB (28th location). When the mortar location is confirmed, the letter C is added.
- h. Series of fires and programs of fires will be designated by code names.
- i. Enemy batteries and mortars will be designated by letter combination as described in chapter 11, FM 6-20.

(Classification)

(Classification)

11. LOCATION OF SUPPORTED UNITS.

a. Corps artillery

- (1) Direct support battalion. Report immediately to next higher headquarters all changes in location of supported unit including planned and actual patrol activity.
- (2) All other field artillery units and field artillery headquarters. Report to next higher headquarters changes observed.
- (3) Corps artillery army aviation officer. Report to corps artillery changes observed.

b. Division artillery. Disseminate all changes in location of supported unit, including planned and actual patrol activity, to corps artillery, subordinate units, and adjacent units.

c. No-fire line (NFL).

- (1) Battle group artillery (direct support battalion).
 - (a) A NFL will be designated by the battle group artillery (direct support battalion) in coordination with the battle group (combat command).
 - (b) Change to NFL will be reported immediately to next higher artillery headquarters.
- (2) All artillery units obtain clearance from appropriate battle group artillery (direct support battalion) prior to firing which results in effects short of the NFL.
- (3) Corps artillery and division artillery coordinate NFL as required and disseminate the location and changes to higher, lower, and adjacent units.

12. FIRE MISSIONS

a. When practicable, a surveyed firing chart will be employed by all field artillery units.

b. Execution.

- (1) When a field artillery headquarters receives more than one fire mission simultaneously, fire will be delivered first on that target or targets considered to be most important.

(Classification)

(Classification)

- (2) Normally a close support mission will be given priority.
- (3) Unless otherwise engaged, field artillery units will respond to appropriate requests for fire from supported units regardless of tactical mission.
- c. Emergency massed fires.
 - (1) Request over corps artillery fire direction (F) net. Insert after "fire mission" the code word (par. 30) for such fires.
 - (2) Corps artillery will publish periodically a code word for emergency massed fires.
 - (3) All available field artillery units will execute this mission if it is within their capabilities.
 - (4) One volley will be fired unless otherwise specified.
 - (5) Units will report execution of mission to the next higher headquarters.

13. FIRE PLANNING.

- a. General. The corps artillery fire plan will be based on—
 - (1) The announced policies of the corps commander.
 - (2) The corps fire support plan.
- b. Coordination. Fire plans will be forwarded to the next higher artillery headquarters for coordination. Coordination will be effected throughout operations as requirement occurs and by the most expeditious means.

14. SECURITY.

- a. Groups coordinate security of subordinate units.
- b. Groups and separate field artillery units plan will provide for protection and security of perimeters, march columns, and convoys.

15. REGISTRATION.

- a. As soon as possible, unless otherwise directed.
- b. Corps artillery units report location of registration point and time of registration to corps artillery FDC.
- c. Preparation will be made for high-burst registration.

16. CORPS ARTILLERY AVIATION COMPANY.

- a. Airfields.

(Classification)

(Classification)

- (1) Corps artillery designates airfields for aircraft not allocated to groups and for base maintenance facilities.
- (2) Groups designate airfield for flights allocated to them.
- (3) Group is responsible for coordinating with corps artillery headquarters regarding location of aircraft of flights placed under operational control of the group.

b. Operation.

- (1) Corps artillery coordinates the schedules for surveillance missions for aircraft retained under corps artillery control.
- (2) Division artillery coordinates the schedules for surveillance missions for aircraft under division artillery control.
- (3) Observers will be provided by the artillery unit utilizing the aircraft.

c. Communication.

- (1) Aircraft allocated to units will operate in appropriate unit radio net. Group airfields maintain communication with the aviation company by operating on the aviation company command channel and with group by operating on the group command channel.
- (2) Aviation company aircraft, not allocated to units, will operate on corps artillery utility net or as directed by corps artillery.

17. CONDITIONS OF AIR RAID WARNING.

The Air Force is responsible for determining the condition of air raid warning which will be announced to the corps air defense artillery control center (ADACC). The condition of air raid warning is indicated by a color code name:

- a. Red—air attack imminent.
- b. Yellow—air attack probable.
- c. White—all clear.

18. OBSERVATION BATTALION.

- a. The observation battalion will establish a survey information center (SIC) in the vicinity of the corps artillery FDC.

(Classification)

(Classification)

- b. Subordinate units coordinate survey plans with SIC.
- c. Schedule of meteorological messages will be announced by corps artillery.

19. FIELD ARTILLERY SEARCHLIGHT BATTERY. See paragraph -----, corps SOP.

- a. Employment of searchlight illumination as directed by corps commander.
- b. Battlefield illumination by searchlight will be coordinated by S2, corps artillery.

20. FIRE SUPPORT COORDINATION.

Note. Inasmuch as fire support coordination is of interest to units other than the artillery, this paragraph is extracted from the corps SOP and included in the artillery annex for emphasis.

a. Reference: FM 6-20.

b. Safety procedures.

(1) Bomb line.

(a) Divisions forward recommended bomb line location to corps FSCC.

(b) Corps FSCC coordinates bomblines recommended by divisions and forwards recommended bomb-line location to the army fire support coordination agency.

(2) When ordered, one of the plans given below will be placed in effect or a flak suppression program may be directed.

(a) Code words. Corps SOL.

(b) Plan Whiskey. No trajectory will cross or come within a specified distance either side of a line defined by two grid references. The distance either side of the defined line will be 500 meters unless specified in the transmission of the plan. For example, "Execute Plan Whiskey, target area, 5135 to 5237, time 1020 to 1040." On receipt of this order, all fire will be suspended over this area (500 yards either side of a line from grid reference 5135 to grid reference 5237) from

(Classification)

(Classification)

1020 to 1040 hours. If a wider area is required, the order may be "Execute Plan Whiskey, target area 5135 to 5237, distance 1,000 meters, time 1020 to 1040."

- (c) Plan Victor. No trajectory will pass over or into an area defined by a circle with an ordinate over 1,100 feet. The radius of this circle will be 2,500 meters unless otherwise specified. This plan may be used when planes come no lower than 1,500 feet. The order to implement this plan is similar to (b) above; for example, "Execute Plan Victor target area 5133, time 1020 to 1040."
- (d) Plan November. No trajectory, other than small arms, will pass over or into an area defined by a circle of a stipulated radius. The radius of this circle will be 2,500 meters unless otherwise specified. This plan may be used when planes operate at very low altitude. It is the same as Plan Victor except the ordinate of the support fire is not considered. All fire is suspended. The size of the area may be changed by specifying a radius if different from 2,500 meters. The order to implement this plan is announced as in (c) above.

c. Fire support planning and fire support plans: FM 6-20.

d. Fire planning and fire plans: FM 6-20.

Section V. LOGISTICS

- 21. GENERAL. Conform to paragraph -----, Logistics, SOP, I Corps.
- 22. AMMUNITION. Corps artillery informs subordinate units of available supply rate.
- 23. EVACUATION. Units directed to nearest clearance station.
- 24. SERVICES. Subordinate units inform corps artillery of service requests.
- 25. MAINTENANCE. Conform to paragraph ---, Logistics, SOP I Corps.

(Classification)

(Classification)

26. CALIBRATION PROCEDURE FOR ARTILLERY. See paragraph ---, Logistics, SOP I Corps.

27. REPORTS.

- a. Ammunition report. Report amounts of ammunition in excess of basic load every 24 hours as of 2400 hours.
- b. Equipment shortage report. Conform with paragraph ---, Logistics, SOP I Corps.
- c. Unit equipment status report. Conform with paragraph ----, Logistics, SOP I Corps.

Section VI. COMMAND

28. COMMAND POSTS. Report movement and location to corps artillery.

29. LIAISON.

- a. Corps artillery maintains liaison with—
 - (1) Corps headquarters.
 - (2) Artillery headquarters of the adjacent corps on the right.
 - (3) Each division artillery headquarters with the corps.
 - (4) Air reconnaissance support battalion or elements at appropriate reconnaissance airfield.
 - (5) Separate corps task force.
- b. Division artillery maintains liaison with artillery headquarters of adjacent division on right.

30. COMMUNICATION.

- a. General. Conform to corps SOI and SSI. All communication officers extract information as necessary and as authorized.
- b. Radio nets. As described in FM 6- and FM 44- series.
- c. Wire system.
 - (1) General.
 - (a) Wire system parallels established radio net.
 - (b) Install wire at the earliest time to permit transfer of communication load from radio to wire.

(Classification)

(Classification)

- (c) Reconnaissance parties will include appropriate wire vehicles.
 - (2) Corps artillery installs wire circuits, including simplex circuit, to the following units.
 - (a) Field artillery observation battalion (including a duplicate circuit).
 - (b) Division artillery (including a duplicate circuit.)
 - (c) Group headquarters.
 - (d) Separate battalions operating directly under corps artillery control.
 - (e) Direct support battalions operating directly under corps artillery control.
 - (f) Corps artillery aviation battery.
 - (g) Field artillery searchlight battery.
 - (3) Priority of installation of trunk circuits by field artillery groups is as follows:
 - (a) Battalions of the group.
 - (b) Reinforced artillery headquarters.
 - (4) Security.
 - (a) Telephone messages of a directive nature are authenticated.
 - (b) Evidence of wire cutting or tapping will be reported immediately.
 - (5) Wire nets for corps artillery units are described in FM 6-series.
- d. Corps artillery fire direction nets F1 and F2.
- (1) General. Corps artillery FDC acts as NCS. See SOI for call signs.
 - (2) Battalions normally do not operate in the corps artillery FDC nets, but those battalions with a nuclear capability continuously monitor the F1 net and transmit during atomic missions only.
 - (3) Additional fire support may be requested by division artillery or group.
 - (a) Requests will include previously designated code words. If selected battalions are desired, each battalion is designated by its call sign in the transmission.

(Classification)

(Classification)

- (b) Procedure for requesting additional fire:
(Net call sign) THIS IS (division artillery or group call sign) (code word)
FIRE MISSION
GRID REFERENCE----- ALTITUDE-----
DESIGNATION OF TARGET-----VOLLEYS
(Omit if one Bn volley is desired.) TOT (when ready).
- (c) If the corps artillery approves the request, it will rebroadcast on the F1 or F2 net or both nets. If mission is TOT, the following will be added at the end of the transmission:
WHEN I SAY TIME, IT WILL BE EXACTLY _____ MINUTES UNTIL TIME ON TARGET _____ 10 SECONDS, 5, 4, 3, 2, 1, TIME. IT IS EXACTLY _____ MINUTES UNTIL TIME ON TARGET. OUT.
- (d) Rebroadcast by corps artillery constitutes a check and is the order to fire.

(Classification)

APPENDIX III

ILLUSTRATIVE EXAMPLE, PLANNING FIELD ARTILLERY OPERATIONS AND FIRE SUPPORT

1. Purpose and Scope

The purpose of this appendix is to illustrate the material presented in the text relative to fire support. The methods by which the various instructions and information pertaining to fire support (particularly field artillery) may be published are also shown. The example sets forth those aspects of fire planning that are of particular concern to field artillery personnel.

2. Situation

a. Aggressor forces employing nuclear weapons landed on the east coast of the United States and, after initial success, were contained in a beachhead. First U. S. Army has now concentrated sufficient force to initiate operations designed to eliminate Aggressor's beachhead.

b. Ninth TAF and Naval Task Force 38 are supporting the operations of First Army.

c. I Corps, a part of First U. S. Army, has the mission of driving south, parallel to the coast line, to clear Aggressor from zone. Included in I Corps are the 1st, 2d, and 3d Infantry Division and the 4th Armored Division.

3. Corps Operation Order

a. First Army commander instructs I Corps commander to seize crossing sites over PENN River. This operation is a part of the First Army attack scheduled for 9 Jan -----, with the seizure of Jerseytown as the initial army objective.

b. I Corps Commander gives his concept of operation to his staff and subordinate (corps artillery and division) commanders, including his mission and tentative plan. Based on this briefing, warning (fragmentary) orders are disseminated within the corps to alert units and initiate planning.

c. The corps staff, including the fire support coordinator, follows the planning processes described in FM 101-5 and, after securing the commander's approval, prepares the corps operation order. As a part of the planning process, the corps FSCC obtains allocation of aircraft for planing from the army tactical support

coordination agency to support the commander's tentative plan. The corps artillery commander determines that sufficient remunerative targets and adequate amounts of artillery and ammunition are available to warrant a 30-minute preparation, if desired by the corps commander. He also outlines the artillery organization for combat for inclusion in the operation order.

d. The corps operation order, shown below, is a formalization and extension of the corps commander's concept of operation and fragmentary orders (*b* above). It gives his staff and subordinate commanders written instructions and information.

(Classification)

(No change from oral orders)

Copy No. 5

I Corps

OCEAN CITY (1919), NEW JERSEY

061000 Jan _____

G232

Opord 11

References: Map, UNITED STATES, 1=50,000, CAPE MAY,
BURGOYNE, CARTHAGE.

1. SITUATION.

a. Enemy forces. Annex A, Intelligence.

b. Friendly forces.

(1) First Army atk 090515 Jan, seizes JERSEYTOWN, and continues atk to the SE.

(2) Elmt of Ninth TAF spt First Army with minimum allocations of 100 TAC bmr and 300 ftr-bmr sorties daily for the period 090500 Jan to 120500 Jan. Priority to I Corps until JERSEYTOWN is seized.

(3) 1st FA Msl Gp (Redstone): GS First Army; priority of fires to I Corps.

(4) Naval TF 38 spts First Army; Naval Fire Support Group (TG 38.1) spts I Corps.

c. Attachments and detachments. Annex B, Troop List.

2. MISSION. Corps atk 090515 Jan, seizes crossing sites over PENN River in zone, prepares to continue atk to the SE. Annex C, Op Overlay.

(Classification)

(Classification)

3. EXECUTION.

a. Concept of operation.

(1) General. Corps atk with 3d, 1st, and 2d Inf Div abreast, 3d Inf Div on east (left), 1st Inf Div in center; penetrates enemy defenses following nuclear and nonnuclear preparation. The 1st Inf Div makes main atk with 4th Armd Div passing through 1st Inf Div after seizure of obj 3.

(2) Maneuver.

(a) Breach enemy main defensive position with armored and infantry attack combined with nuclear weapons to break through rapidly to the second defensive area. Second defensive area must be reached quickly prior to its occupation in strength by the enemy. Passage of the 4th Armd Div and seizure of crossing sites at PENN River must be expedited.

(b) Early relief of the 4th Armd Div by the 1st Inf Div and maximum spt at the PENN River will be provided.

(c) Continue attack to SE of corps objective on order.

(3) Fire support.

(a) Artillery. Normal rates of fire continued until 090445 Jan. Artillery with corps fires a 30-minute preparation initiated by the nuclear attack. Priority of fires initially to the 1st Inf Div, then 4th Armd Div on passage through 1st Inf Div. Appendix I, Arty Fire Plan to Annex D, Fire Support Plan.

(b) Tactical Air. Prior to D-1, all available tactical air spt will be employed on the interdiction program with emphasis on class III and V installations. On D-1, emphasis of tactical air spt missions will be shifted to the attack of enemy command and communication installations. On D-Day maximum air effort to close spt and interdiction, Appendix 2, Air Fire Plan to Annex D, Fire Support Plan.

(c) Nuclear. Corps has been allocated 30 nuclear weapons of ALFA, BRAVO, CHARLIE, DELTA, and

(Classification)

(Classification)

ECHO types; 15 of these are further allocated to divisions. Of the weapons retained by corps, 3 BRAVO (10-KT) and 1 CHARLIE (20-KT) will be employed on targets in the initial attack of the main defensive zone; 2 ECHO (75-KT) weapons will be employed on enemy reserves in the JERSEYTOWN area; 1 CHARLIE (20-KT) weapon will be held on call to expedite passage of the 4th Armd Div. Corps will reserve 8 weapons for employment against deep on-call targets and targets of opportunity in the corps zone. Surface bursts will not be employed. Maximum damage to aggressor personnel and armor without exceeding negligible damage to friendly troops. A nuclear preparation will be fired 090445 Jan. Appendix 3, Nuclear Fire Plan, to Annex D, Fire Support Plan.

(d) Naval. Naval Fire Support Group (TG 38.1) supports the corps with 2 BB, 4 CA, 1 CL, and 2 DD. Appendix 4, Naval Gunfire Plan, to Annex D, Fire Support Plan.

b. 1st Inf Div:

Atch: 1st How Bn (105-mm, SP), 40th Arty
1st How Bn (155-mm, SP), 50th Arty

c. 2nd Inf Div:

Atch: * * *

d. 3d Inf Div:

Atch: * * *

e. Corps Arty:

- (1) 4th Armd Div Arty; GS-reinf 1st Inf Div Arty; revert to control of 4th Armd Div upon commitment.
- (2) 101st FA Group: GS-reinf 1st Inf Div Arty.
- (3) 102d FA Group: GS-reinf 2d Inf Div Arty.
- (4) 103d FA Group: GS.
- (5) 104th FA Group: GS, prepared to reinf 4th Armd Div Arty on order.
- (6) Btry A (Slt), 33d Arty: GS.
- (7) 1st Obsr Bn, 37th Arty: GS.

(Classification)

(Classification)

- (8) 1st How Bn (105-mm, SP), 40th Arty: Atch 1st Inf Div.
- (9) 2d How Bn (105-mm, SP), 40th Arty: Atch 3d Inf Div.
- (10) 1st How Bn (155-mm, SP), 50th Arty: Atch 1st Inf Div.
- (11) 1st Msl Bn (Honest John, SP), 82d Arty: GS.
- (12) 2d Msl Bn (Honest John, SP), 82d Arty: GS.
- (13) 3d Msl Bn (Honest John, SP), 82d Arty: GS.
- (14) 1st Msl Bn (Cpl), 91st Arty: GS.
- (15) Corps Arty Avn Co: Spt I Corps Arty.
- (16) Annex D, Fire Support Plan.

f. Air Defense Artillery:

* * * * *

m. Corps Res. 4th Armd Div pass through 1st Inf Div on corps order on seizure of obj 3.

n. Coordinating instructions.

- (1) Hourly reports of location of leading elements to this headquarters.
- (2) Prior to attack, movement of units other than routine administrative and supply convoys will be made during the hours of darkness.
- (3) EEI. Will the enemy employ nuclear weapons in I Corps zone? If so, when, where, how many, what yield, by what delivery means?
- (4) Troop safety instructions.
 - (a) All personnel not in lightproof shelters will wear goggles or cover eyes with opaque material from 090440 to 090450 Jan.
 - (b) Remainder of troop safety—SOP.

4. ADMINISTRATION AND LOGISTICS.

- a. Army AdminO 6.
- b. Corps AdminO 5.

5. COMMAND AND SIGNAL.

- a. Signal. Annex F, Sig Index 1-66, SOI, eff 090001 Jan.
- b. Command. Divisions report locations of alternate command

(Classification)

(Classification)

posts.
Acknowledge.

LIGHTFOOT

Lt Gen

Annexes: A—Intelligence (omitted)
B—Troop List (omitted)
C—Operation Overlay (omitted)
D—Fire Support Plan
E—Engineer (omitted)
F—Signal (omitted)

Distribution: A
III Corps

OFFICIAL:

/s/ Smith
SMITH
G3

(Classification)

4. Corps Fire Support Plan

a. Having heard the corps commander's oral announcement of his concept of operations, the corps artillery commander as fire support coordinator initiated action, through the FSCC, to prepare the fire support plan. The fire support plan is evolved in close coordination with the corps commander and his staff to reflect and amplify the commander's concept of operations.

b. The fire support plan is issued as an annex to the corps operation order. It forms the basis for the detailed fire plans of the available fire support means and the divisions' fire support plans. Such appendixes are issued as required to support the fire support plan. An appendix may be issued for the artillery fire plan, the nuclear fire plan, the air fire plan and the naval gunfire plan, a target summary, and other appropriate plans or data relative to fire support. The fire plan appendixes are issued on completion of the necessary coordination and integration within the FSCC; the distribution of the fire support plan annex is not delayed pending preparation, coordination, or integration of the appendixes. Appendixes to the fire support plan annex are issued in whatever form is most appropriate.

c. *The corps artillery fire plan is developed simultaneously with the fire plans of the subordinate units and is coordinated with them.* The corps artillery fire plan normally shows only those

fires planned by the corps artillery headquarters and those fires requested by subordinate units.

d. The naval gunfire and air fire plans are prepared in the FSCC in accordance with the agreements reached between Air, Navy, and Army representatives. The naval gunfire and the air fire plans are not orders to the Navy or Air Force; they are issued to present information to the force as a whole.

e. Appendixes (corps artillery fire plan, etc.) which would be issued to support the corps fire support plan have been omitted from this example; the appendixes issued by corps reflect and amplify those issued by the divisions.

f. The fire support plan annex shown below is issued to accompany the corps operation order.

(Classification)

Copy No. 2

I Corps

OCEAN CITY (1919), NEW JERSEY

061000 Jan _____

EW 23

Annex D (Fire Support Plan) to Opord 11

References: Map, UNITED STATES, 1:50,000, CAPE MAY—
BURGOYNE—CARTHAGE

1. SITUATION.

a. Enemy forces.

- (1) Annex A (Intelligence) to Opord 11.
- (2) En air capable of 40 bomber and 150 fighter bomber sorties daily in zone of I Corps.

b. Friendly forces.

- (1) First Army attacks 090515 Jan, seizes JERSEYTOWN, and continues attack to the SE.
- (2) Elm of Ninth TAF spt First Army with minimum allocation of 100 TAC bmr and 300 ftr-bmr sorties daily for the period 090500 Jan to 120500 Jan. Priority to I Corps until JERSEYTOWN is seized.
- (3) 1st FA Msl Gp (Redstone): GS First Army; priority of fires to I Corps.
- (4) Naval TF 38 supports First Army; Naval Fire Support Group (TG 38.1) supports I Corps.

(Classification)

(Classification)

- c. Attachments and detachments. Annex B (Troop List) to Opord 11.
2. MISSION. Corps atk 090515 Jan seizes crossing sites over PENN River in zone, prepares to continue atk to the SE. Annex C (Op Overlay) to Opord 11.

3. EXECUTION

- a. Concept of operation. Corps atk with 3d, 1st, and 2d Inf Div abreast, 3d Inf Div on east (left), 1st Inf Div in center; penetrates enemy defenses following nuclear and nonnuclear preparation; 1st Inf Div makes main atk with 4th Armd Div passing through 1st Inf Div after seizure of GORDONTOWN. The enemy main defensive position will be breached with armored and infantry attack combined with nuclear weapons to break through rapidly to the second defensive area. Second defensive area must be reached quickly prior to its occupation in strength by the enemy. Passage of the 4th Armd Div and seizure of crossing sites at PENN River must be expedited. Early relief of the 4th Armd Div by the 1st Inf Div and maximum support at the PENN River will be provided. The atk will be continued to SE of corps objective on order. Surface bursts will not be employed. Maximum damage to aggressor personnel and armor without exceeding negligible damage to friendly troops.

b. Tactical Air Spt

(1) General.

- (a) Effective immediately and until D-1, all available tactical air support concentrates on attack of known enemy class III and V supply installations.
- (b) On D-1, all available tactical air interdict between lines _____ and _____, concentrating on lines of communication and command installation.
- (c) On D-day, maximum tactical air effort to close spt and interdiction.

(2) Allocations.

- (a) I Corps is allocated for period 090500 Jan to 120500 Jan:
1. 40 TAC bmr sorties daily.
 2. 100 ftr-bmr sorties daily.

(Classification)

(Classification)

(b) Suballocations submitted are:

1. 16 ftr-bmr on air alert from H to H + 1 over corps zone to be assigned missions as cleared by corps FSCC, armament mixed load.
2. 20 ftr-bmr sorties to 1st Inf Div for period 090500 Jan to 090800 Jan.

(c) Priority to 4th Armd Div for ftr-bmr column cover during movement.

(d) Allocation of FAC:

- 1st Inf Div—7
- 2d Inf Div—4
- 3d Inf Div—4
- 4th Armd Div—3 until committed, then 7.

(3) Miscellaneous.

(a) Requests for preplanned air support daily to corps FSCC by 1530 hours.

(b) App 2, Air Fire Plan.

c. Arty Spt.

(1) General.

(a) Arty with the Corps will spt the attack with preparation H-30 minutes to H-hour.

(b) Normal arty fires prior to H-30 minutes.

(c) Corps heavy cannon and short-range missile arty units will have priority of corps unit position areas in zone of 1st and 3d Inf Div.

(2) Organization for combat.

(a) 4th Armd Div Arty.

GS, reinf 1st Inf Div Arty; revert to control 4th Armd Div on order.

(b) 101st FA Gp.

- 2d How Bn (155-mm, SP), 50th Arty.
 - 2d How Bn (155-mm, Towed), 51st Arty.
 - 1st How Bn (8-in, SP), 70th Arty.
 - 2d How Bn (8-in, SP), 70th Arty.
- GS, reinf 1st Inf Div Arty.

(c) 102d FA Gp.

- 3d How Bn (155-mm, SP), 50th Arty
- 4th How Bn (155-mm, SP), 50th Arty
- 3d How Bn (155-mm, Towed), 51st Arty

(Classification)

(Classification)

- 4th How Bn (155-mm, Towed), 51st Arty
3d How Bn (8-in, SP), 70th Arty
GS, reinf 3d Inf Div Arty
- (d) 103d FA Gp.
1st Gun Bn (155-mm, SP), 60th Arty
1st Gun Bn (155-mm, Towed), 61st Arty
4th How Bn (8-in, SP), 70th Arty
1st How Bn (8-in, Towed), 71st Arty
2d How Bn (8-in, Towed), 71st Arty
GS.
- (e) 104th FA Gp.
5th How Bn (155-mm, SP), 50th Arty
6th How Bn (155-mm, SP), 50th Arty
7th How Bn (155-mm, SP), 50th Arty
2d Gun Bn (155-mm, SP), 60th Arty
3d Gun Bn (155-mm, SP), 60th Arty
3d How Bn (8-in, Towed), 71st Arty
GS, prepared to reinf 4th Armd Div Arty on order.
- (f) Btry A (Slt), 33d Arty: GS.
- (g) 1st Obsr Bn, 37th Arty: GS.
- (h) 1st How Bn (105-mm, SP), 40th Arty: Atch 1st Inf Div.
- (i) 2d How Bn (105-mm, SP), 40th Arty: Atch 3d Inf Div
- (j) 1st How Bn (155-mm, SP), 50th Arty: Atch 1st Inf Div.
- (k) 1st Msl Bn (Honest John, SP), 82d Arty: GS.
- (l) 2d Msl Bn (Honest John, SP), 82d Arty: GS.
- (m) 3d Msl Bn (Honest John, SP), 82d Arty: GS.
- (n) 1st Msl Bn (Cpl), 91st Arty: GS.
- (o) Corps Arty Avn Co.
Flt Gp A: (4 L-19s, 2 H-13s) Atch 101st FA Gp.
Flt Gp B: (4 L-19s, 2 H-13s) Atch 102d FA Gp.
Flt Gp C: (4 L-19s, 2 H-13s) Atch 104th FA Gp.
Btry (-): GS.
- (3) Miscellaneous.
- (a) 1st Inf Div Arty schedule fires 4th Armd Div Arty H-30 minutes to H-hour, and fires of 101st FA Gp

(Classification)

(Classification)

H-15 minutes to H-hour; 2d Inf Div Arty schedule fires 102d FA Gp H-15 minutes to H-hour.

(b) App 1, Arty Fire Plan.

d. Nuclear Spt.

(1) General. Corps has been allocated 30 nuclear weapons of ALFA, BRAVO, CHARLIE, DELTA, and ECHO types; 15 of these are further allocated to division. Of the weapons retained by corps, 3 BRAVO (10-KT) and 1 CHARLIE (20-KT) weapon will be employed on targets in the initial attack of the main defensive zone; 2 ECHO (75-KT) weapons will be employed on enemy reserves in the JERSEYTOWN area; 1 CHARLIE (20-KT) weapon will be held on call to expedite passage of the 4th Armd Div. Corps will reserve 8 weapons for employment against deep on-call targets and targets of opportunity in the corps zone. A nuclear preparation will be fired 090445 Jan.

(2) Allocation.

	Type of weapon				
	A	B	C	D	E
(a) Corps	3	4	4	2	2
(b) 1st Inf Div	2	3	2		
(c) 2d Inf Div	1		1		
(d) 3d Inf Div	1	1	1		
(e) 4th Armd Div	1	1	1		

(3) Miscellaneous. App 3, Atomic Fire Plan.

e. Naval Spt.

(1) Allocation of naval gunfire support.

Corps - 1 BB, 1 CA: GS.

1st Inf Div - 1 BB, 2 CA for GS missions until passage of 4th Armd Div.
1 CL for DS missions.

3d Inf Div - 1 CA for GS missions.
2 DD for DS missions.

4th Armd Div (on passage through 1st Inf Div) -
1BB,
2 CA for GS missions.

(Classification)

(Classification)

(2) Allocation of control personnel.

	<u>SFCP</u>	<u>NGFL teams</u>	<u>NGF teams</u>	<u>Air spot</u>
Corps	—	—	1	1
1st Inf Div	10	5	1	5
3d Inf Div	10	5	1	5
4th Armd Div	9	3	1	4

(3) Miscellaneous. App 4, Naval Gunfire Plan.

f. Coordinating instructions.

- (1) Report of post strike analysis of targets to corps on completion of study by fire support agency.
- (2) Air Fire Plan, Arty Fire Plan, Naval Gunfire Plan, Nuclear Fire Plan, prepared by div to reach corps by 081200 Jan.
- (3) App 5, Target Summary.
- (4) All personnel not in lightproof shelters will wear goggles or cover eyes with opaque material from 090440 to 090450 Jan.

4. ADMINISTRATION AND LOGISTICS.

a. Army AdminO 6, I Corps AdminO 5.

b. Aval Sup Rate, 9–12 Jan.

- (1) Nonnuclear (rds per wpn per day).
 - 4.2-inch Mort—150
 - 105-mm How—150
 - 155-mm How—100
 - 155-mm Gun—80
 - 8-inch How—60
 - 762-mm Rkt—3 rd per launcher per day
- (2) Nuclear.
 - ALFA—8
 - BRAVO—9
 - CHARLIE—9
 - DELTA—2
 - ECHO—2

5. COMMAND AND SIGNAL.

a. Signal.

- (1) Index 1–66, SOI, eff 090001 Jan.
- (2) Joint SOI 22–3a, eff 081200 Jan.

(Classification)

(Classification)

b. FSCC.

(1) Corps FSCC (195342).

(2) Other FSCC's, rept loc.

Acknowledge.

LIGHTFOOT

Lt Gen

Appendixes: 1—Arty Fire Plan (omitted).

2—Air Fire Plan (omitted).

3—Nuclear Fire Plan (omitted).

4—Naval Gunfire Plan (omitted).

5—Target Summary (omitted).

Distribution: A

III Corps

OFFICIAL:

/s/ Smith

SMITH

G3

(Classification)

5. Division Operation Order

a. The division commanders, having received the corps commander's concept of the operation and fragmentary orders (par. 3, this app.), in turn issue their concepts and orders to their staffs and their artillery and battle group commanders. Thus the planning process begins in the divisions prior to receipt of the corps operation order. By maintaining close liaison with the corps staff, the division staff, including the fire support coordinator, obtain additional pertinent information on which to base estimates, plans, and orders. Similarly, the subordinate units of the division are kept appraised of developments in the planning.

b. On receipt of the corps operation order, final modifications are made in the division plan and the division operation order is issued. The order (overlay type) of the 1st Inf Div is shown in figure 29.

6. Division Fire Support Plan

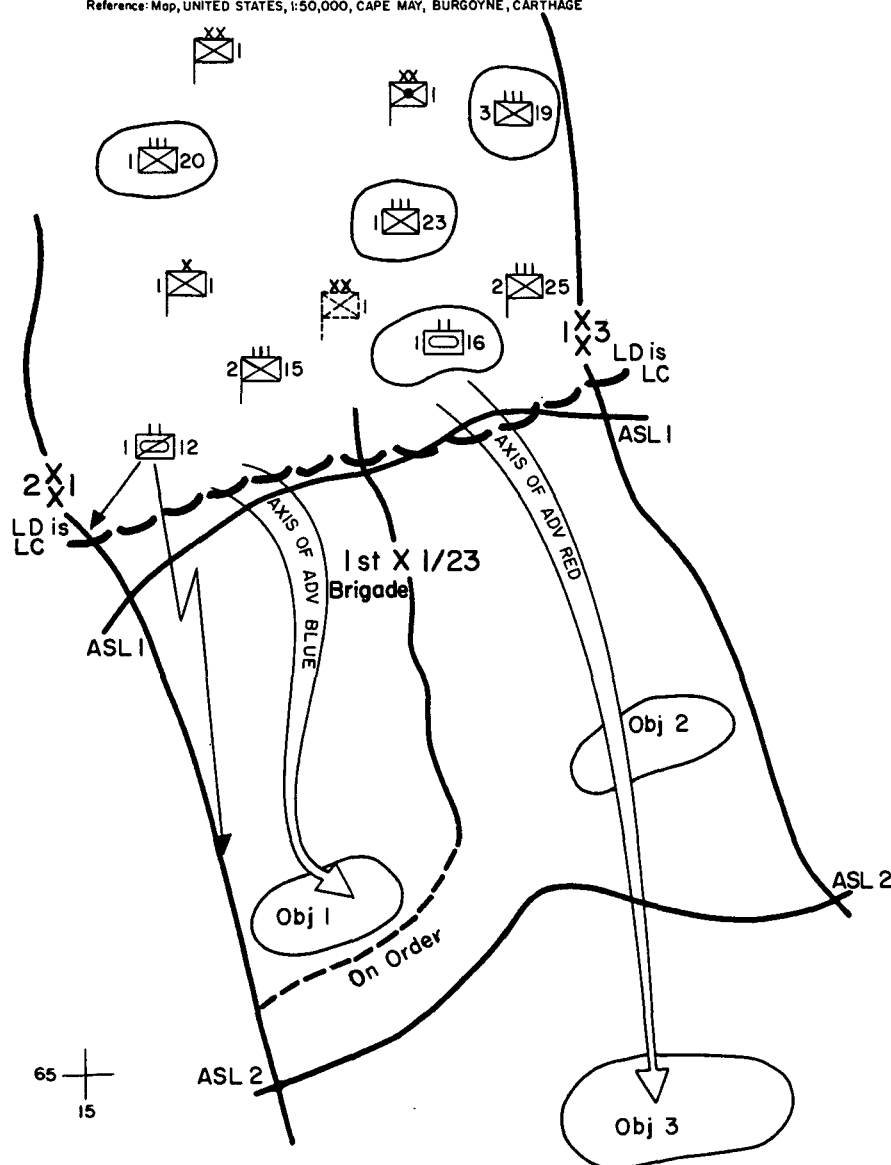
a. The division fire support plan is prepared in conjunction with the plan of operations according to the division commander's tentative plan. Although based on the corps fire support plan, its preparation begins before receipt of the corps fire support plan. Close liaison between the fire support representatives both at

(Classification)

Copy Nr 2
1st Inf Div
BRIGANTINE (1687), NEW JERSEY
070830 JAN
WL 36

Opord 12

Reference: Map, UNITED STATES, 1:50,000, CAPE MAY, BURGOTNE, CARTHAGE



(Classification)

1. SITUATION
 - a. Enemy forces. Annex A, Intelligence.
 - b. Friendly forces.
 - (1) 1 Corps atk 090515 Jan. seizes crossing sites over PENN River in zone. prepares to continue atk to SE.
 - (2) 4th Arm Div passes through 1st Inf Div after seizure of obj 3.
 - (3) 1st 10th TAF spt First Army with minimum allocation of 100 TAC bnr and 300 ft-br sorties daily for the period 090500 Jan to 120500 Jan. Priority to 1 Corps until seizure of JERSEYTOWN.
 - (4) Naval TF 38 spt First Army: Naval Fire Support Group (TG 38.1) spt 1 Corps.
 - (5) 101st FA Gp: GS, 1 Corps: reinf 1st Inf Div Arty.
 - (6) 4th Arm Div Arty: GS, 1 Corps: reinf 1st Inf Div Arty: revert to control 4th Arm Div on order.
 - (7) 1st FA Wtl Gp (Redstone): GS, First Army: priority of fire to 1 Corps.
 - c. Attachments and detachments. Atch effective 061000 Jan.
 - (1) 1st How Bn (105-mm SP), 40th Arty.
 - (2) 1st How Bn (155-mm SP), 50th Arty.
2. MISSION
Div atk 090515 Jan: assists passage of 4th Arm Div after seizure of GORDONTOWN: relieves 4th Arm Div on order after seizure of crossings over PENN River: prepares to continue atk to SE.
3. EXECUTION
 - a. Concept of operation.
 - (1) General. The atk will be a rapid exploitation of nuclear fires. Surprise is vital. Maximum dispersion consistent with the accomplishment of mission will be maintained throughout the operation.
 - (2) Maneuver. The div will atk with the 1st Tk Bn, 16th Armor: 1st Bn, 23d Inf: and 2d Bn, 25th Inf: on the east (left) making the main atk under division control. The 2d Bn, 16th Inf, and 1st Recon Sq, 12th Cav. will be on the west (right) under control of 1st Brig. The 1st Bn, 20th Inf, and 3d Bn, 19th Inf, will be initially in Div reserve. Following nuclear attack, the 1st Tk Bn and 1st Brig rapidly penetrate enemy defense.
 - (3) Fire support. Artillery spt the atk with nuclear preparation at H-30 minutes, followed by 30-nonuclear minute nonatomic preparation by artillery and naval fires. Available air spt will be employed following delivery of nuclear weapons. Four nuclear weapons available for on-call targets and targets of opportunity. Surface bursts will not be employed. Maximum damage to aggressor personnel and armor without exceeding negligible damage to friendly troops. Annex B, Fire Support Plan.
 - b. 2d Bn, 16th Inf: Atch to 1st Brig.
 - c. 1st Bn, 23d Inf: Follow and spt 1st Tk Bn, 16th Armor.
 - d. 2d Bn, 25th Inf: Support by fire atk 1st Tk Bn. On passage of 1st Tk Bn, protect div east (left) flank from LD to obj 2.
 - e. 1st Brig:
 - Atch: 2d Bn, 16th Inf
 - 1st Recon Sq, 12th Cav
 - Seize and hold obj 1. Protect div west (right) flank. prepare to continue atk on order.
 - f. Div Arty:
 - (1) 1st How Bn, 17th Arty
Btry A, 1st How Bn
Btry B, 1st How Bn
Btry C, 2d FA Bn
Reinf 1st How Bn, 40th Arty, prepare to spt 1st Bn, 23d Inf, on order.
 - (2) 2d FA Bn, 18th Arty
Btry C, 1st How Bn
Btry D, 1st How Bn
Btry E, 1st How Bn
Btry B, 2d FA Bn
Support 1st Brig.
 - (3) Btry C, 2d FA Bn, 18th Arty: GS
 - (4) Btry D, 2d FA Bn, 18th Arty: GS
 - (5) 1st How Bn, 40th Arty: GS 1st Tk Bn, 16th Armor
 - (6) 1st How Bn, 50th Arty: GS
 - (7) Annex B, Fire Support Plan
 - g. 1st Tk Bn, 16th Armor: Seize obj 2: on order seize obj 3. Assist passage of 4th Arm Div on seizure obj 3.
 - h. 1st Recon Sq, 12th Cav: atch to 1st Brig.
 - i. 1st Engr Bn.
 - (1) Support 1st Brig and 1st Tk Bn, 16th Armor, with one company each.
 - (2) Annex C, Engineer.
 - j. Div Res.
 - (1) 3d Bn, 19th Inf. Priority of employment in zone of 1st Bn, 23d Inf.
 - (2) 1st Bn, 20th Inf. Priority of employment in zone of 1st Brig.
 - k. Coordinating instructions.
 - (1) Maximum assistance to passage of 4th Arm Div.
 - (2) EEI: Will the enemy employ nuclear weapons in the div zone, if so, when, where, how many, what yield, and by what delivery means?
 - (3) Troop safety.
 - (a) All personnel not in lightproof shelters will wear goggles or cover eyes with opaque material from 090440 to 090450 Jan.
 - (b) Personnel forward of ASL 1 will be in tanks or 4-foot deep foxholes from 090450 to 090450 Jan.
 - (c) No troops forward of ASL 2 without clearance from division.
 - (d) Subordinate units will be notified of nuclear fires through command and fire direction channels.

4. ADMINISTRATION AND LOGISTICS. AdminO B.

5. COMMAND AND SIGNAL. Index B-II, S01.

Acknowledge

GREEN
Maj: Gen

Annexes: A - Intelligence (omitted).
B - Fire Support Plan.
C - Engineer (omitted).

Distribution: A
2d Inf Div
3d Inf Div
4th Arm Div
101st FA Gp

OFFICIAL:
/s/ Brown
BROWN
63

Figure 29. Infantry division operation order.

(Classification)

25
85

Copy Nr 3
1st Inf Oiv
BRIGANTINE (1687), NEW JERSEY
072200 Jan

Appendix 1 (Air Fire Plan) to Annex B (Fire Support Plan) to Opord 12.

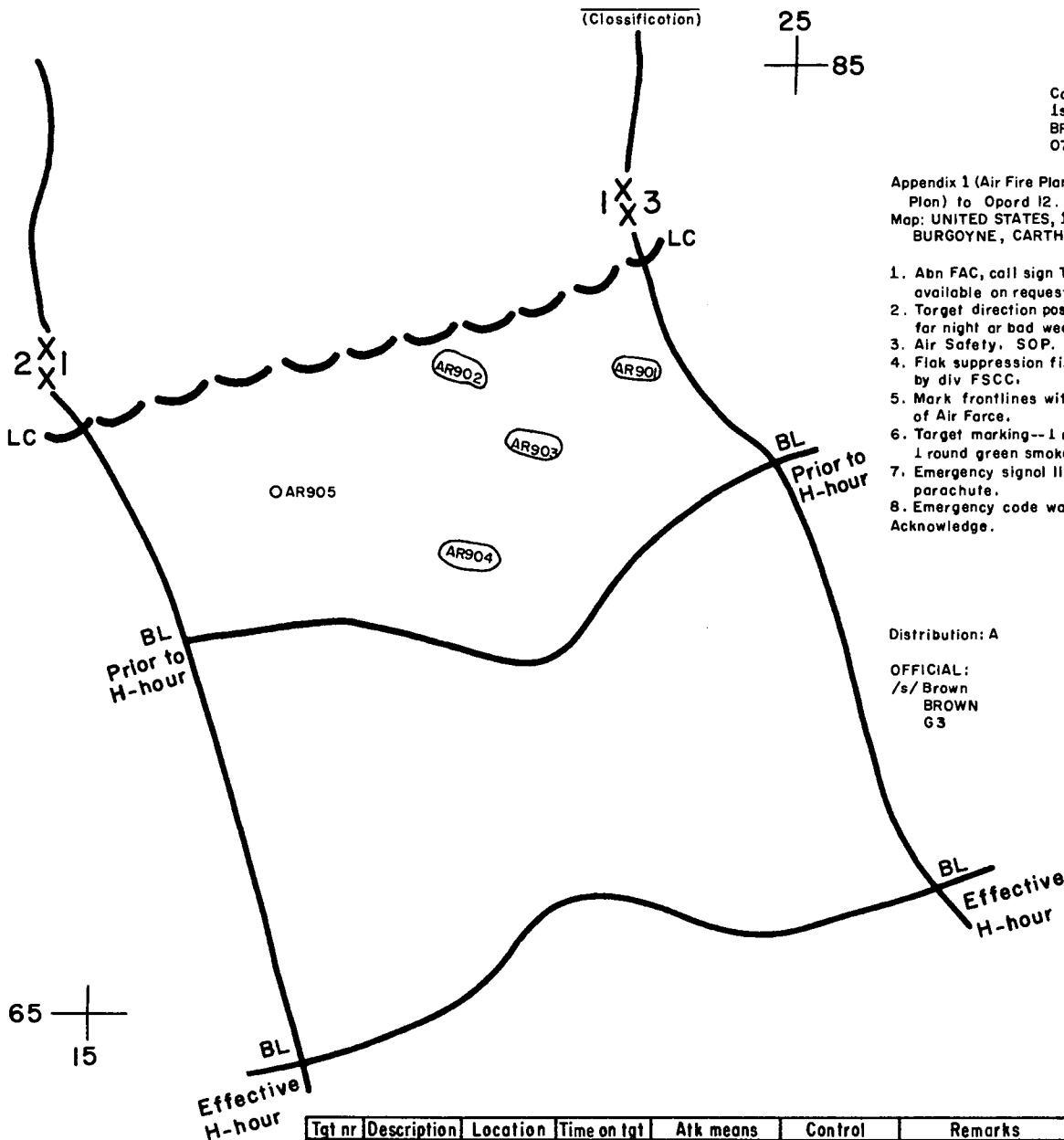
Map: UNITED STATES, 1:50,000, CAPE MAY, BURGUYNE, CARTHAGE

1. Abn FAC, call sign THUNDER 12 or 14 available on request through div G3 air.
2. Target direction post SCARECROW available for night or bad weather bombing.
3. Air Safety. SOP.
4. Flak suppression fires on request; coordinated by div FSCC.
5. Mark frontlines with code of day on request of Air Force.
6. Target marking-- 1 round red smoke; alternate 1 round green smoke--on request.
7. Emergency signal lift airstrike: white star parachute.
8. Emergency code word to lift air strike: JACKPOT. Acknowledge.

GREEN
Maj Gen

Distribution: A

OFFICIAL:
/s/ Brown
BROWN
G3



Tgt nr	Description	Location	Time on tgt	Atk means	Control	Remarks
AR901	Rifle co	23397731	On call	4 ftr/ bmr Rocket/napalm		Coordinates mk center area of activity.
AR902	Rifle co	19737760	090515Jan	4 ftr/ bmr Napalm	Mk w/smoke on flt ldr, FAC w/1st Tank Bn, 16th Armor	
AR903	CP in woods	21507580	090520Jan	4 fltr/ bmr Rkt/napalm		Area tgt. No ground obsr, in flt rept.
AR904	Ammo dump	18117230 18417280	090530Jan	4 fltr/ bmr Rkt/napalm		
AR905	OP on hill	16907450	On coll	4 fltr/ bmr Napalm	Mk w/smoke on coll flt ldr, FAC w/2d BG, 15th Inf	

(Classification)

Figure 30. Division air fire plan.

corps and division FSCC and the artillery FDC is maintained to acquaint corps with division requirements and to inform division of corps decisions. Similarly, fire support representatives at subordinate echelons maintain contact with representatives in the division FSCC and in the division artillery FDC. The division plan of operations and the fire support plan are evolved at the same time so the fire support plan annex can accompany the division operation order (par. 5, this app.) when it is issued.

b. As at corps, the fire support plan annex is issued with such appendixes as are readily prepared. Those, such as supporting fire plans, which require more time for preparation, are issued later. The fire support plan annex issued by the 1st Inf Div is shown below.

(Classification)

Copy No. 2

1st Inf Div

BRIGANTINE (1687), NEW JERSEY

070830 Jan _____

DL 142

Annex B (Fire Support Plan) to Opord 12.

References: Map, UNITED STATES, 1:50,000, CAPE MAY
—BURGOYNE—CARTHAGE

1. SITUATION.

a. Enemy forces.

- (1) Annex A (Intelligence) to Opord 12.
- (2) Enemy air capable of 40 bomber and 150 fighter-bomber sorties per day in zone of I Corps.

b. Friendly forces.

- (1) I Corps atk 090515 Jan, seizes crossing sites over PENN River in zone, prepares to continue atk to the SE.
- (2) Elmt of Ninth TAF spt First Army with minimum allocation of 100 TAC bmr and 300 ftr-bmr sorties daily for the period 090500 Jan to 120500 Jan. Priority to I Corps until JERSEYTOWN is seized.
- (3) Artillery support.
 - (a) 1st FA Msl Group (Redstone): GS First Army; priority of fires to I Corps.

(Classification)

corps and division FSCC and the artillery FDC is maintained to acquaint corps with division requirements and to inform division of corps decisions. Similarly, fire support representatives at subordinate echelons maintain contact with representatives in the division FSCC and in the division artillery FDC. The division plan of operations and the fire support plan are evolved at the same time so the fire support plan annex can accompany the division operation order (par. 5, this app.) when it is issued.

b. As at corps, the fire support plan annex is issued with such appendixes as are readily prepared. Those, such as supporting fire plans, which require more time for preparation, are issued later. The fire support plan annex issued by the 1st Inf Div is shown below.

(Classification)

Copy No. 2

1st Inf Div

BRIGANTINE (1687), NEW JERSEY

070830 Jan _____

DL 142

Annex B (Fire Support Plan) to Opord 12.

References: Map, UNITED STATES, 1:50,000, CAPE MAY
—BURGOYNE—CARTHAGE

1. SITUATION.

a. Enemy forces.

- (1) Annex A (Intelligence) to Opord 12.
- (2) Enemy air capable of 40 bomber and 150 fighter-bomber sorties per day in zone of I Corps.

b. Friendly forces.

- (1) I Corps atk 090515 Jan, seizes crossing sites over PENN River in zone, prepares to continue atk to the SE.
- (2) Elmt of Ninth TAF spt First Army with minimum allocation of 100 TAC bmr and 300 ftr-bmr sorties daily for the period 090500 Jan to 120500 Jan. Priority to I Corps until JERSEYTOWN is seized.
- (3) Artillery support.
 - (a) 1st FA Msl Group (Redstone): GS First Army; priority of fires to I Corps.

(Classification)

(Classification)

(b) 4th Armd Div Arty:

- 7th How Bn (105-mm, SP), 13th Arty
- 9th How Bn (105-mm, SP), 14th Arty
- 11th How Bn (105-mm, SP), 15th Arty
- 12th FA Bn, (Rkt/How), 16th Arty

GS I Corps, reinf 1st Inf Div arty; revert to control 4th Armd Div on order.

(c) 101st FA Gp:

- 2d How Bn (155-mm, SP), 50th Arty
- 2d How Bn (155-mm, Towed), 51st Arty
- 1st How Bn (8-in, SP), 70th Arty
- 2d How Bn (8-in, SP), 70th Arty

GS I Corps, reinf 1st Inf Div Arty

(4) Naval support. Naval Fire Support Group (TG 38-1) spts I Corps; fire support unit two (TU 38.1.2) provides support to division.

c. Attachments and detachments. Attached effective 071000 Jan:

- (1) 1st How Bn (105-mm, SP) 40th Arty.
- (2) 1st How Bn (155-mm, SP) 50th Arty.

2. MISSION. Division atk 090515 Jan; assists passage of 4th Armd Div after seizure of GORDONTOWN; relieves 4th Armd Div on order after seizure of crossing over PENN River, prepares to continue atk to SE.

3. EXECUTION.

a. Concept of operation.

- (1) General. The atk will be a rapid exploitation of nuclear fires. Surprise is vital. Maximum dispersion consistent with accomplishment of mission will be maintained throughout the operation.
- (2) Maneuver. The div will atk with the 1st Tk Bn, 16th Armor; 1st BG, 23d Inf; and 2d BG, 25th Inf; on the east under division control. The 2d BG, 15th Inf, and 1st Recon Sq, 12th Cav, will be on the west under control of 1st Brigade. The 1st BG, 20th Inf, and 3d BG, 19th Inf, will be initially in Div reserve. Following nuclear atk, the 1st Tk Bn and 1st Brigade rapidly penetrate enemy defense.

(Classification)

(Classification)

- (3) Fire support. At H-30 minutes, division will employ 3 nuclear weapons to neutralize enemy defenses and major located reserves in div zone. A 30-minute non-nuclear preparation, will follow. Available tactical air spt will be employed following delivery of nuclear weapons. Division will reserve 4 nuclear weapons for use against on-call targets and targets of opportunity. Surface bursts will not be employed. Maximum damage to aggressor personnel and armor without exceeding negligible damage to friendly troops.
- b. Tactical air support.
- (1) General. Sixteen fighter bombers on air alert from H to H+1 hour over corps zone to be assigned missions as cleared by corps FSCC. Armament—mixed load.
- (2) Allocations.
- (a) Twenty fighter-bomber sorties allocated to div for period 090500 to 090800 Jan. Priority initially to 1st Tank Bn, 16th Armor.
- (b) FAC's allocated as follows:
- 1 FAC to each battle group.
 - 1 FAC to division artillery.
 - 1 FAC to 1st Tk Bn, 16th Armor.
- (c) Miscellaneous. App 1, Air Fire Plan.
- c. Artillery Support.
- (1) General. Artillery spt the atk with nuclear preparation at H-30 minutes, followed by 30-minute nonnuclear preparation.
- (2) Organization for combat.
- (a) 1st How Bn, 17th Arty.
- Btry A, 1st How Bn.
 - Btry B, 1st How Bn.
 - Btry A, 2d FA Bn.
- Reinf 1st How Bn, 40th Arty. Prepare to spt 1st BG, 23 Inf on order.
- (b) 2d FA Bn, 18th Arty.
- Btry C, 1st How Bn.
 - Btry D, 1st How Bn.

(Classification)

(Classification)

Btry E, 1st How Bn.

Btry B, 2d FA Bn.

Spt 1st Brigade.

(c) Btry C, 2d FA Bn: GS.

(d) Btry D, 2d FA Bn: GS.

(e) 1st How Bn, 40th Arty: DS 1st Tank Bn, 16th
Armor.

(f) 1st How Bn, 50th Arty: GS.

(3) Miscellaneous.

(a) 1st How Bn, 40th Arty, schedule fires Mort Btry 1st
BG, 23d Inf H-30 min to H-hour.

(b) App 2, Artillery Fire Plan.

d. Nuclear support.

(1) General. I Corps has allocated 1st Inf Div 7 nuclear
weapons. 1 ALFA, 1 BRAVO and 1 CHARLIE weap-
on will be fired in support of initial penetration. Re-
maining weapons—1 ALFA, 2 BRAVO, and 1 CHAR-
LIE—will be used against on-call targets and targets
of opportunity.

(2) Allocation for employment.

(a) 1st Tk Bn.

1—BRAVO

1—CHARLIE

(b) 1st Brigade.

1—ALFA

(3) Miscellaneous. App 3, Nuclear fire plan.

e. Naval support.

(1) General. Fire support unit two (TU 38.1.2) spt the atk
beginning H-1 hour; H-30 min to H-1 hour, spt atk
with preparation.

(2) Allocation of naval gunfire support.

1 BB, 2 CA: GS div until passage of 4th Armd Div.

1 CL: DS 1st Tank Bn, 16th Armor.

(3) Allocation of control personnel.

	<u>SFCP</u>	<u>NGFL teams</u>	<u>NGF teams</u>	<u>Air spot</u>
1st Inf Div	—	—	1	—
2d BG, 15th Inf	2	1	—	1
3d BG, 19th Inf	2	1	—	1

(Classification)

(Classification)

	<u>SFCP</u>	<u>NGFL teams</u>	<u>NGF teams</u>	<u>Air spot</u>
1st BG, 20th Inf	1	—	—	—
1st BG, 23d Inf	2	1	—	1
2d BG, 25th Inf	2	1	—	1
1st Tank Bn, 16th Armor	1	1	—	1

(4) Miscellaneous. App. 4, Naval Gunfire Plan.

f. Coordinating instructions.

- (1) Troop safety. Negligible risk to troops protected and warned.
- (2) Subordinate units will be notified of nuclear fires through command and fire direction channels.
- (3) No troops forward of ASL 1 prior to 090450 Jan.
- (4) Report of post strike analysis of targets to div on completion of study by fire support agency.
- (5) BG arty fire plans to reach div arty FDC by 071800 Jan; requests for prearranged air missions, naval fires, and nuclear fires, to div FSCC by 071800 Jan.
- (6) All personnel not in lightproof shelters will wear goggles or cover eyes with opaque material from 090440 to 090450 Jan.

4. ADMINISTRATION AND LOGISTICS. Div AdminO 8.

5. COMMAND AND SIGNAL.

a. Signal. Index 8-11, SOI.

b. Command. SOP.

Acknowledge.

GREEN

Maj Gen

Appendixes: 1--Air Fire Plan

(to be published later).

2--Atry Fire Plan

(to be published later).

3--Nuclear Fire Plan

(to be published later).

4--Naval Gunfire Plan

(to be published later).

(Classification)

(Classification)

Distribution: A
2d Inf Div
3d Inf Div
4th Armd Div
101st FA Gp

OFFICIAL:
/s/ Brown
BROWN
G3

(Classification)

7. Division Air Fire Plan

The division air fire plan is normally prepared by the G3 air in the division FSCC, under the supervision of the fire support coordinator or his designated representative. It is not an order to the supporting air, but provides information to the force. The air fire plan appendix is shown in figure 30.

8. Division Artillery Fire Plan

a. The artillery fire plan to support the division's operations is prepared in the division artillery FDC by coordinating and consolidating fire plans of the battalions (FM 6-101) and separate batteries of the division to include battle group artillery (FM 6-21). Targets of particular interest to the division as a whole and concentrations requested by the battle group artillery or direct support battalions are scheduled for other artillery available to the division. Occasionally, higher headquarters will have requirements which must be included.

b. In planning the fires for support of the 1st Inf Div attack, concentrations are planned for confirmed and suspect targets and for the protection of the reorganization after seizure of objectives 1, 2, and 3. In addition, check concentrations to be used for orientation of observers and troops are planned. All concentrations plotted on the overlay are listed in the target list. Those to be fired on a time schedule are listed in the schedule of fires. The schedule of fires graphically points out the concentrations to be fired, the units to fire, the time of firing, and the amount of ammunition to be expended on each concentration by the firing unit.

c. When the artillery fire plans of lower echelons have been coordinated, consolidated, augmented, and integrated into a division artillery fire plan, additional required fires are obtained from

corps artillery or, if not available, adjustments are made in the fire plan. Coordination and integration of the artillery fire plan with the nuclear, naval gunfire, and air fire plans is accomplished in the division FSCC and any required adjustments are made. Units are notified of any changes affecting their fire plans, and the artillery fire plan appendix (fig. 31) to the division fire support plan annex is issued.

9. Nuclear Fire Plan

The division nuclear fire plan is normally prepared by the division artillery operations representative in the division FSCC, under the supervision of the fire support coordinator or his designated representative. The nuclear fire plan to support the 1st Infantry Division is shown in figure 33.

10. The Naval Gunfire Plan

a. The division naval gunfire plan is normally prepared by the division naval gunfire officer in the division FSCC, under the supervision of the fire support coordinator or his designated representative. The naval gunfire plan is not a directive to the supporting naval unit, but provides information to the force.

b. The naval gunfire plan to support the 1st Infantry Division attack is shown in figure 34.

11. Continuation of Planning

After the orders for the attack are issued, the planning process continues. Late intelligence and new information affecting the operation are evaluated and, if appropriate, modifications are made to the previously issued instructions. Developments on other fronts are examined to determine their possible influence on the forthcoming operation. The planning process continues at all echelons throughout the operation with all foreseeable contingencies considered.

12. The First Infantry Division Attack

a. The attack of the 1st Infantry Division moved off according to plan and objectives 1, 2, and 3 were seized. As the infantry reorganizes and prepares to continue the attack, the fires planned to protect the reorganization are augmented by additional fires on other avenues of approach. Field artillery forward observers and liaison officers plan and coordinate these additional protective concentrations with the supported unit commanders and other available fire support representatives. Check rounds are fired on certain critical concentrations and any necessary additional fires to support the continuation of the attack are planned. As in the

b. The division artillery operations chart is maintained to reflect the fires previously planned and those additional concentrations (*a* above) received from the battle group artillery, artillery battalions, and other sources.

c. In figure 35, the 1st Infantry Division Artillery operations chart is shown as it appeared approximately 1 hour after objective 3 was seized.

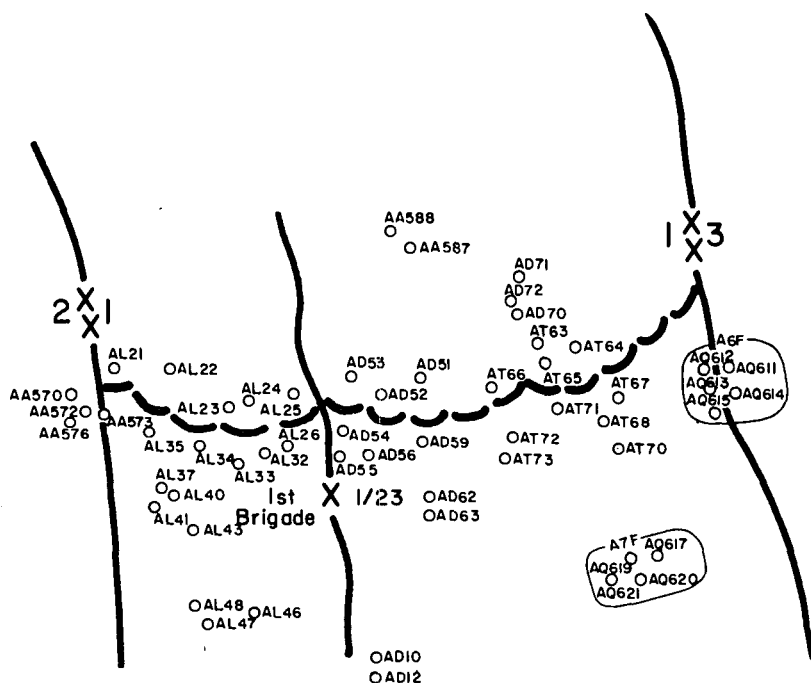


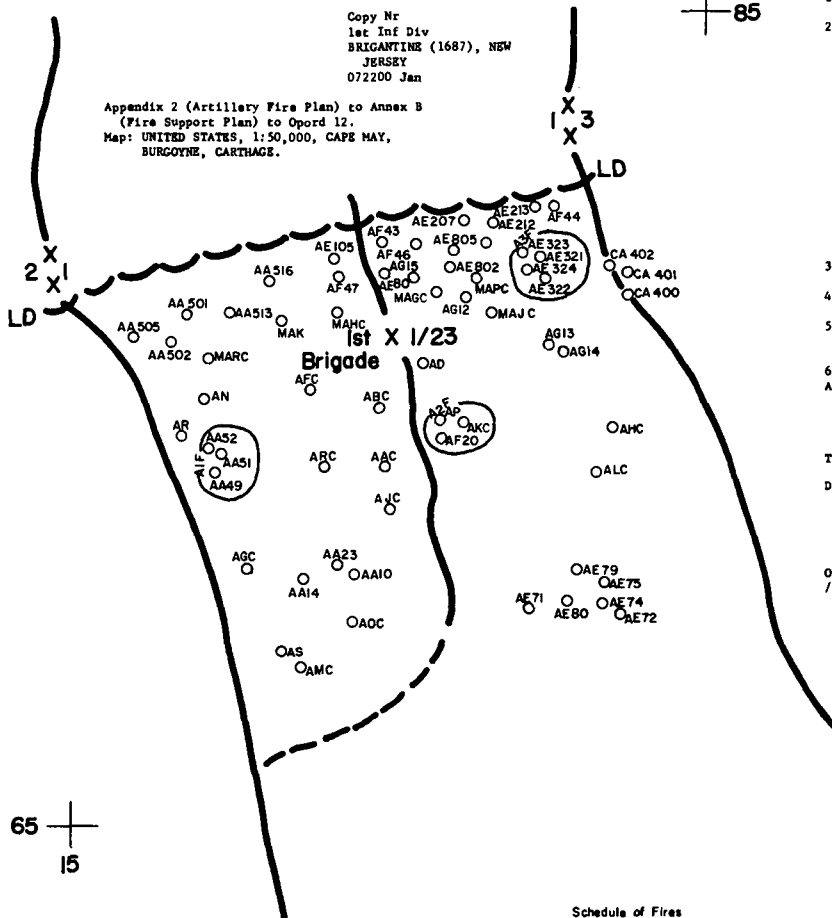
Figure 35. Division artillery operations chart.

(Classification)

25
85

Copy Nr
1st Inf Div
BRIGANTINE (1687), NEW
JERSEY
072200 Jan

Appendix 2 (Artillery Fire Plan) to Annex B
(Fire Support Plan) to Opord 12.
Map: UNITED STATES, 1:50,000, CAPE MAY,
BURGOYNE, CARTHAGE.



- Boundaries, LD, axis of advance, concentration and groups of fires planned--
as overlay.
- Scheduled Fires.
 - Countermortar program. Fire parallel sheaf, center range, shell HE, first volley fuse VT, subsequent volleys 1/2 fuse quick and delay.
 - Maintenance of neutralization of countermortar program. Total ammunition expenditure per concentration: 12 rounds. Units deliver 2 rounds on mortar positions at irregular intervals, as follows:
1st How Bn, 70th Arty--MARC, MAK, MAHC
2d How Bn, 50th Arty--MAGC, MAPC, MAJC
 - Tank assembly areas. Fire open sheaf, 1/2 C range spread, first volley, shell HE, fuse VT or time; subsequent volleys: 1/3 shell HE, fuse quick; 1/3 shell HE, fuse delay; and 1/3 shell WP.
 - Smoke missions. Shell HC. Smoke for period indicated or until requested to lift, as follows:
2d How Bn, 51st Arty, AA502, H-hr to H+30 min, provide own observer.
2d How Bn, 70th Arty, AF43 and AE322, H-hr to H+30 min. 1st How Bn, 40th Arty, provide observer.
- Medium batteries and battalions be prepared to deliver on-call smoke missions as indicated in target list.
- Request 3d Inf Div Arty schedule CA400, CA401, and CA402 early in preparation and smoke CA402 from H-hr to H+60 min or until requested to lift.
- Request I Corps Arty
 - Schedule AAC, ARC, AP, AHC, and AF20 in preparation.
 - Include hostile heavy mortars in counterbattery program.
- Air strikes marked by red smoke or alternate green smoke as directed. Acknowledge.

GREEN
Maj Gen

Tab: A--Pan areas and zones of fire.

Distribution: A
2d Inf Div
3d Inf Div
4th Arm Div
101st FA Gp

OFFICIAL:
/s/ Brown
BROWN
G3

Target List				
Nr	Description	Location	Alt	Remarks
AE207	Entrenchment	20217521	163	
AE212	Entrenchment	20527330	170	
AE213	Machine gun	20827543	189	
AE321	CP	20967452	171	POW
AE322	Observation post	20917472	176	
AF43	OP, camouflage	1907512	168	
AF44	Entrenchment	20917523	152	
AF45	Entrenchment	20447510	163	
AG12	Road block	20217462	172	
AG13	Company assembly area	20917254	154	
AD	2-120-mm How	19227251	158	Corps c Mtr program

Schedule of Fires

Bn	Btry	-30	-28	-26	-24	-22	-20	-18	-16	-14	-12	-10	-8	-6	-4	-2	H
1st Bn 40th Arty	A	AE 207 1 2	AE 805 1 2	AG 12 6	AF 45 1 2	AE 212 1 2	AE 213 6	AF 44 1 2	AE 321 1 2	AE 322 6	AE 805 1 2						
	B	AE 207 1 2	AE 805 1 2	AG 12 6	AF 45 1 2	AE 212 1 2	AE 213 6	AF 44 1 2	AE 321 1 2	AE 322 6	AF 45 1 2						
	C	AE 207 1 2	AE 805 1 2	AG 12 6	AF 45 1 2	AE 212 1 2	AE 213 6	AF 44 1 2	AE 321 1 2	AE 322 6	AG 12 6						
1st Bn 17th Arty		AF 43 1 8	AG 15 3 6	AF 46 3 6	AG 13 3 6	AG 14 3 6	AE 324 3 6	AE 323 3 6	AE 802 3 6	AE 803 3 6	AF 46 3 6						

Notes:

- All artillery battalions available to 1st Infantry Division have been scheduled; however, only schedules for two battalions are shown. Fire planning is continuous, therefore, other concentrations will be planned as the situation develops.
- The ammunition requirements computed for each target are shown in the schedule of fires under the concentration number. For the purposes of this illustration, ammunition requirements are shown only for those targets listed on the accompanying extract of the target list.

(Classification)

Figure 31. Division artillery fire plan.

(Classification)

Figure 32. Position areas and zones of fire.

Copy Nr 2
1st Inf Div
BRIGANTINE (1687), New Jersey
072200 Jan

Appendix 3 (Nuclear Fire Plan) to Annex B (Fire Support Plan) to Opord 12.

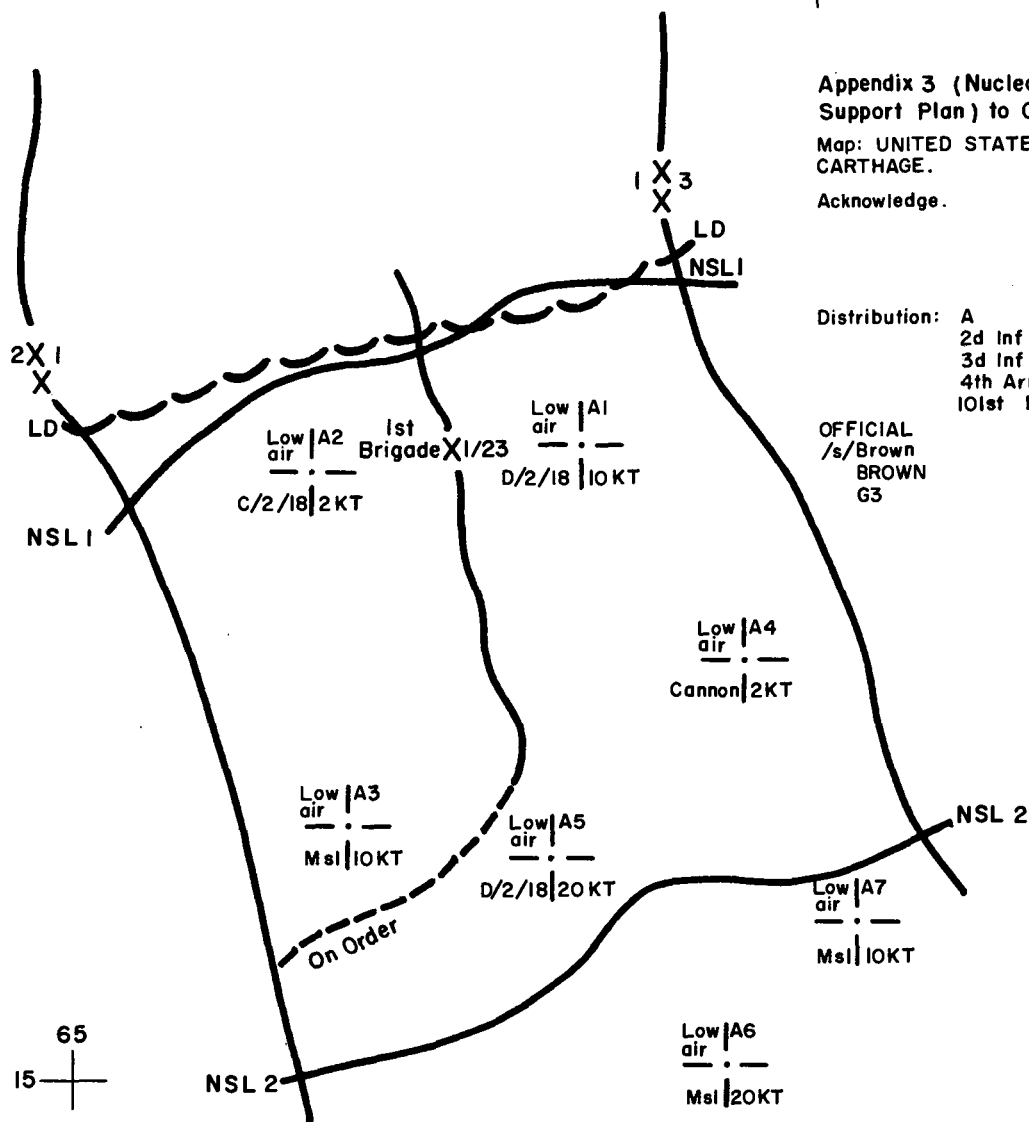
Map: UNITED STATES, 1:50,000 CAPE MAY, BURGoyNE, CARTHAGE.

Acknowledge.

Green
Maj Gen

Distribution: A
2d Inf Div
3d Inf Div
4th Armd Div
101st FA Gp

OFFICIAL
/s/ Brown
BROWN
G3



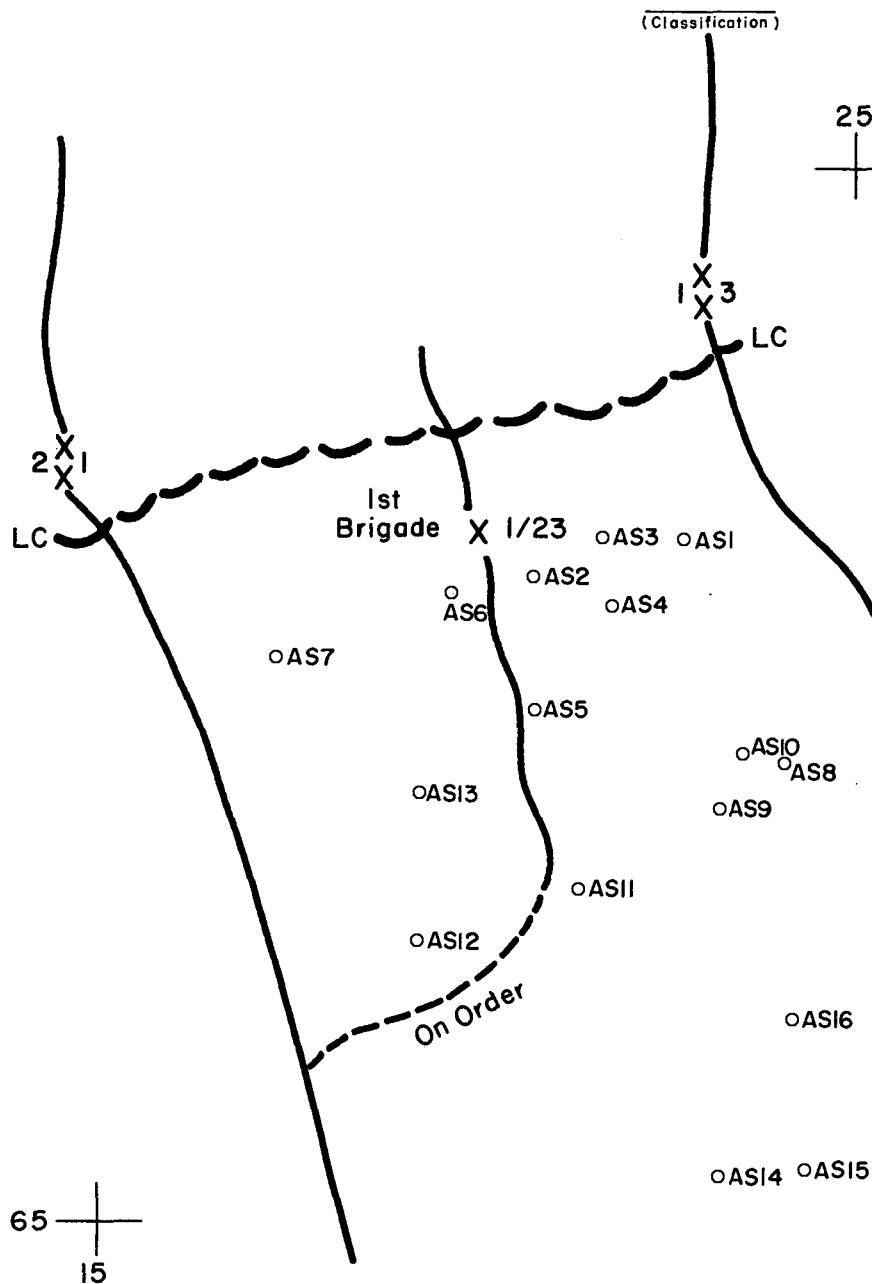
Scheduled fire

Tgt nr	Description	Type Weapon	Delivery Unit	Time of burst	Height of burst	Desired Ground Zero	Maximum allowable CEP	Estimated casualties	Predicted condition of target area after burst
A1	Frontline troops: elm rifle bn	BRAVO 10-KT	D/2/18	090445 Jan	Low air	21607356	250 meters	1/3 to 1/2 of frontline troops	Some tree blowdown.
A2	Frontline troops: elm rifle bn	ALFA 2-KT	C/2/18	090445 Jan	Low air	17157340	Zero	Troops in area	Minor tree blowdown. No obstacle.
A5	Tank regt (-)	CHARLIE 20-KT	D/2/18	090445 Jan	Low air	21216820	250 meters	20 to 40% Tank regt	Bldg blowdown. Some tree blowdown. Can be bypassed.

On-Call fires

A3	Prepared position	BRAVO 10-KT	Missile	On-Call	Low air	18576790	250 meters		Tree blowdown. No serious obstacle.
A4	Prepared position	ALFA 2-KT	Cannon	On-Call	Low air	241695	Zero	Neutralization	Some bldg blowdown. No serious obstacles. Neutron-induced gamma activity.
A6	Prepared position	CHARLIE 20-KT	Missile	On-Call	Low air	24156520	250 meters		Considerable tree blowdown. Secondary fires.
A7	Possible assembly area	BRAVO 10-KT	Missile	On-Call	Low air	25506725	250 meters		Considerable obstacle. Can be bypassed.

Figure 33. Nuclear fire plan.



Schedule of Fire

Unit	-30	-25	-20	-15	-10	-5	H-hour
BB2		AS 2				AS 5	
		20 rd 16-in				50 rd 16-in	
CA4		AS 6				AS 7	
		200 rd 5-in				50 rd 8-in	
CA5		AS 10				AS 13	
		100 rd 5-in				100 rd 5-in	
		50 rd 8-in					
CLI		AS 3				AS 4	
		50 rd 6-in				100 rd 5-in	

Target List

Nr	Description	Location	Altitude	Remarks
AS1	Concrete troop shelter	22107315	165	Destroy prior to H-hour
AS2	OP dug in	19217314	180	
AS3	Assembly area	20187330	182	
AS4	CP	20087211	156	
AS5	Tank co	19107201	161	
AS6	Assembly area	18117308	162	
AS7	Tank co	17427306	157	
AS15	Missile Assembly area	22256546	148	
AS16	Missile launching site	22286514	149	

(Classification)

Figure 34. Naval gunfire plan.

13. Defensive Fire Planning

a. As the 1st Infantry Division was preparing for the passage of the 4th Armored Division, the Commanding General, 1st Infantry Division, received instructions from the I Corps Commander to assume the defensive along the present line of contact. He is informed that owing to developments in the III corps zone, the remainder of I Corps and First Army is also assuming a defensive role. The Commanding General, 1st Infantry Division, immediately issued fragmentary orders informing subordinate commanders of the change in plans and directing them to assume the defensive along the present line of contact.

b. Commanders of units occupying the forward edge of the battle area, and units designated to occupy other defensive localities for the purpose of providing depth to the defense initiate immediate readjustment of the units and the temporary defenses which were established on seizure of objective 3. Commanders confer with their staffs, fire support coordinators, and the supporting engineer unit commander to plan for barriers, minefields, etc. Recommendations and requests for changes in boundaries and additional engineer and tank support are forwarded to division.

c. The artillery protective fires (par. 12, this app.) already planned are reexamined, augmented, and closely coordinated with infantry fires, defensive plans, and barriers. Except for the battle group artillery, only one barrage is assigned each artillery battery providing close support fires. Two barrages (one to each platoon) may be assigned the battle group artillery. The barrages are carefully located and fired-in. Survey is extended to locate accurately the barrages and critical defensive concentration. Artillery fires are coordinated at each level by the artillery representative (forward observer with the rifle company, liaison officer with the armor battalion, battle group artillery commander or his representative at battle group), both with the supported unit's defense plans and organic fires and with other fire support available. Fires beyond the capabilities of battle group artillery, direct support artillery, and reinforcing artillery are requested through artillery channels.

d. Artillery fire plans for the support of a defense include fires planned on likely avenues of approach and fires planned throughout the depth of the defensive area. However, the fire plan should not be so cluttered with concentrations that it would be more confusing than if no plan were used. A fire plan should also be prepared to support each counterattack plan.

e. As in planning fires to support an attack, the division artillery fire plan for a defensive situation is a reflection of fire plans pre-

pared by artillery units providing close support fires, augmented by fires desired by division. However, defensive artillery fire plans published by corps and division normally show *all* planned concentrations including those of the battle group artillery, direct support units, and other artillery units providing close support fires.

f. On completion, the artillery fire plan is coordinated with corps artillery and, at the division FSCC, with the division plan of defense and other fire plans. The artillery fire plan is published as an appendix to the fire support plan annex which accompanies the division operation order. Concurrent with preparation of the artillery fire plan, plans for other fire support means are prepared. The nuclear fire plan to support the defense will include on-call concentrations on possible assembly areas or attack positions and major avenues of approach. Nuclear fires are planned within the battle area and to support counterattack plans. The 1st Infantry Division Artillery organizations for combat to support the defense is as follows:

- (1) 1st How Bn, 17th Arty: GS-reinf 1st BG Arty, 238 Inf., 1st BG, 23d Inf with one 105-mm How Btry.
- (2) 2d FA Bn, 18th Arty: GS-reinf 2d BG Arty, 15th Inf., 2d BG, 15th Inf with one 105-mm How Btry.
- (3) 1st How Bn, 40th Arty: DS, 1st Recon Sq 12th Cav.

Note. No change has been made in the missions of other artillery with the division, and no change has been made in batteries under control of the 1st How Bn, 17th Arty, and 2d FA Bn, 18th Arty.

g. The artillery fire plan for the defensive operation is shown in figure 36.

Figure 36. Division artillery fire plan for the defense.

APPENDIX IV

A PROCEDURE FOR PREPARING SCHEDULES OF CORPS ARTILLERY FIRES

1. Purpose and Scope

The purpose of this appendix is to illustrate a procedure for preparing a schedule of fires for corps artillery, by using the fire capabilities checklist. This procedure may be used at all echelons of artillery for planning the schedule of fires. The fire capabilities checklist does not in any way replace the overlay and concentration type of fire plan; rather, it assists in the *scheduling* of fires where large amounts of artillery are involved.

2. Procedure

The use of the checklist in preparing a schedule of fires, although primarily mechanical, is flexible and can be arranged to reflect specific policies for attack of targets, phasing of a preparation, maintenance of neutralization, or other special considerations. The following planning sequence is recommended in preparing a schedule of fires for phase I, counterbattery:

a. From the fire capabilities overlay and concentration overlay, enter the heavy battalions on the left and medium battalions on the right of the fire capabilities checklist (fig. 37). Indicate the targets each battalion (battery) is capable of attacking by placing a diagonal line in the appropriate blocks. A separate checklist may be made for a specific phase; i.e., a counterbattery phase or a period during which safety measures for aircraft delivering air strikes require restrictions on artillery fire.

b. Determine and enter the number of targets each battalion is capable of attacking. Then, enter the number of battalions which can attack each target (fig. 38). Establish the order of planning for the battalions by indicating the battalion which can attack the fewest targets as first in order of planning, the battalion which can attack the next fewest targets as second in order of planning, etc. Where more than one battalion can attack the same number of targets, assign the order of planning from left to right on the checklist.

c. Establish as the first target in priority for scheduling that target which can be attacked by the fewest battalions, the target which can be attacked by the next fewest battalions as second, etc.

Heavy artillery battalions				Medium artillery battalions				
Order of planning		Priority for scheduling targets	Number of battalions that can hit target	Target	Number of battalions that can hit target	Priority for scheduling targets	Order of planning	
Number of targets battalion can hit							Number of targets battalion can hit	
Heavy battalions							Medium battalions	
1/60	1/70						1/50	3/50
				AAC				
				AB				
				ACC				
				ADC				
				AE				

Figure 37. Fire capabilities checklist showing battalions and targets.

(fig. 38). Where more than one target can be attacked by the same number of battalions, assign the priority for scheduling from top to bottom. On the fire capabilities checklist in figure 38, the 1st Howitzer Battalion, 70th Artillery is number 1 in order of planning. Concentrations AB, ANC, ATC, and AZ can be attacked by only one battalion. Since the assignment of priority for scheduling is from top to battalion when more than one target can be attacked by the same number of battalions, concentration AB is number 1 in priority.

d. As the targets are planned, a schedule of fires worksheet is prepared. Plan first the battalion capable of attacking the fewest targets; then, of the targets that the battalion can attack, plan first the target which can be attacked by the fewest battalions. As each target is planned, the time of firing is indicated on the schedule of fires worksheet (fig. 40) and a second diagonal line is drawn through the block on the checklist (fig. 39) corresponding to the battalion to fire. After planning for a specific target is complete, place a zero over the diagonal mark(s) under the battalion(s) not to be scheduled for the target.

e. The corps artillery commander directed that two battalions fire simultaneously on each enemy battery; preferably one to be a medium battalion. Therefore, plan first the medium battalion; then, plan a heavy battalion.

Order of planning										Priority for scheduling targets	Number of battalions that can hit target	Target	Number of battalions that can hit target	Priority for scheduling targets	Order of planning					
9	8	6	10	1	2	3	7	4	5						3	1	4	2	5	6
Number of targets battalion can hit															Number of targets Battalion can hit					
10	8	7	12	4	4	4	7	5	5						5	3	5	3	5	6
Heavy battalions															Medium battalions					
1/60	2/60	3/60	1/61	1/70	3/70	4/70	1/71	2/71	3/71						1/60	2/60	3/60	5/60	2/61	3/61
										5	2	AAC	2	13						
										1	1	AB	0							
										6	2	ACC	2	14						
										25	5	ADC	2	15						
										16	3	AE	0							
										17	3	AFC	1	1						
										7	2	AGC	1	2						
										8	2	AHC	1	3						
										26	5	AI	2	16						
										9	2	AJC	1	4						
										18	3	AKC	1	5						
										10	2	ALC	0							
										11	2	AM	3	19						
										2	1	ANC	1	6						
										12	2	AOC	1	7						
										13	2	APC	1	8						
										14	2	AOC	0							
										22	4	ARC	2	17						
										15	2	ASC	1	9						
										3	1	ATC	0							
										23	4	AU	0							
										19	3	AVC	2	18						
										20	3	AWC	1	10						
										24	4	AXC	1	11						
										21	3	AY	1	12						
										4	1	AZ	0							

Figure 38. Fire capabilities checklist showing order of planning and priority for scheduling targets.

Order of planning										Priority for scheduling targets	Number of battalions that can hit target	Target	Number of battalions that can hit target	Priority for scheduling targets	Order of planning					
9	8	6	10	1	2	3	7	4	5						3	1	4	2	5	6
Number of targets battalion can hit															Number of targets battalion can hit					
10	8	7	12	4	4	4	7	5	5	5					3	5	3	5	6	
Heavy battalions										Medium battalions										
1/60	2/60	3/60	4/60	5/60	6/70	3/70	4/70	1/71	2/71	3/71	1/80	2/80	3/80	4/80	5/80	6/80				

Figure 39. Fire capabilities checklist showing planned targets.

	-30	-25	-20	-15	-10	-5	H Hr	+ 5
1st How Bn, 50th Arty								
2d How Bn, 50th Arty	ACC	AVC	AM					
3d How Bn, 50th Arty								
5th How Bn, 50th Arty	AXC	ADC	AI					
2d How Bn, 51st Arty								
3d How Bn, 51st Arty								
1st Gun Bn, 60th Arty								
2d Gun Bn, 60th Arty								
3d Gun Bn, 60th Arty								
1st Gun Bn, 61st Arty								
1st How Bn, 70th Arty	ACC		AM					
3d How Bn, 70th Arty		AVC						
4th How Bn, 70th Arty	AXC	ADC	AI					
1st How Bn, 71st Arty								
2d How Bn, 71st Arty								
3d How Bn, 71st Arty								

Figure 40. Worksheet for a schedule of fires.

f. If a group of fires is scheduled in the preparation, all concentrations of the group should, if possible, be fired on simultaneously.

g. The following symbols are used:

/ Target is within the fire capabilities of the battalion indicated.

X Target is to be attacked by the battalion indicated.

∅ No fire is planned on the target by the battalion indicated.

h. A worksheet for maintenance of neutralization is shown in figure 41. The time available to each battalion is determined from the completed worksheet for the schedule of fires. The share of targets is determined by dividing the total time available by the total number of targets to be attacked. Adjustments are then made according to the fire capabilities and time available to each battalion.

Unit	Time available	Share of targets	Targets assigned	Ammo
1st Gun Bn, 60th Arty	10 min	3	AB, AAC, AJC, APC, ASC	90 rd
2d Gun Bn, 60th Arty	10 min	3	ANC, AM, AOC, AQC, AVC	90 rd
3d Gun Bn, 60th Arty	10 min	3	ATC, ALC	36 rd
1st Gun Bn, 61st Arty	15 min	5	AZ, AFC, AWC, AY	72 rd
1st How Bn, 70th Arty	5 min	2	ACC, AGC, AHC	24 rd
4th How Bn, 70th Arty	5 min	2	AU, AXC	16 rd
2d How Bn, 71st Arty	10 min	3	AKC, ARC	16 rd
3d How Bn, 71st Arty	15 min	5	AE, ADC, AI	24 rd
Total	80 min	26	155-mm gun-288 rd 8-inch how-80 rd	

Figure 41. Worksheet for maintenance of neutralization.

INDEX

	Paragraphs	Page
Accuracy:		
Of information	174	112
Of means	181	120
Of target location	179	117
Requirements in shelling reports	205	145
Activities:		
Counterbattery	192-196	133
Countermortar	197-201	138
Adjutant, duties	25	16
Advance guard	73	48
Aerial:		
Observation	63, 64, 92, 148	40, 41, 64, 100
Observers	64, 75, 121, 135, 140, 142, 148	41, 49, 83, 95, 97, 98, 100
Photograph(s) :		
Distribution	229	163
Reconnaissance	75, 92	49, 64
Aeropack artillery	3, 124, 139	3, 90, 96
Agencies:		
Collecting target information	173	111
Contributing counterbattery information	195	137
Air-transportable artillery	124	90
Airborne:		
Artillery	124	90
Operations	124-129	90
Briefing personnel	129	93
Communication means	124, 128	90, 92
Estimates	125	91
Factors affecting	124, 129	90, 93
General	124	90
Intelligence	127	92
Photograph interpretation	127	92
Planning	125	91
Rehearsals	126	92
Security	129	93
Training	126	92
Aircraft:		
Air alert	229	163
Air Force reconnaissance	64	41
Army	64, 91	41, 64
Flares	66	44
Laying wire	92, 137	64, 96

	Paragraphs	Page
Airfields.....	94	65
All available artillery.....	232, 247	171, 189
Alternate positions.....	107	73
Ammunition:		
Authorized excess.....	269	209
Available supply rate.....	266	207
Basic load.....	267	208
For immediate consumption.....	267	208
Nuclear.....	268	209
Overages.....	267	208
Reports, administrative.....	269	209
Requirements, estimate.....	266	207
Responsibility.....	28, 269	18, 209
Supply.....	265	207
For amphibious operations.....	120, 121	81, 83
System.....	265-269	207
Amphibious operations.....	118-123	80
Aerial photograph.....	121	83
Ammunition plan.....	121	83
Artillery employment.....	121	83
Auxiliary weapons employed as field artillery.....	120	81
Fire support plan.....	119	80
Hydrographic effects.....	120	81
Photographic reconnaissance.....	121	83
Planning.....	118, 119,	80, 83
	121	
Rehearsal.....	122	88
Target information.....	121	83
Terrain and weather effects.....	120	81
Time of landing.....	121	83
Training directives.....	119	80
Analysis:		
Crater. (<i>See</i> Crater analysis.)		
Post strike.....	170	109
Shell fragments.....	203	145
Target. (<i>See</i> Target analysis.)		
Annex, fire support plan.....	230, app. II,	168, 215,
	III	248
Appendixes to fire support plan annex.....	230, app. III	168, 248
Armored amphibians employed as field artillery.....	83, 120	57, 81
Army artillery.....	13	8
Commander.....	19	10
Fire direction center.....	247	189
Fire planning.....	235, 236	172, 173
Organization for combat.....	56	32
Reconnaissance.....	75	49
Tactical missions.....	60	39
Army aviation.....	56, 91-94	32, 64
Airfields.....	94	65
Aerial photography.....	92	64
Capabilities.....	92	64
Employment.....	56, 93	32, 65
Officer.....	32	20

	Paragraphs	Page
Army group artillery	14	8
Officer	20	11
Staff	21	12
Arctic operations	130-137	93
Artillery fires	136	95
Camouflage discipline	134	94
Communications	137	96
Movement	133	94
Observation	135	95
Positions	134	94
Preparation	131	93
Survey	132	94
Training	131	93
Artificial moonlight	86	58
Artillery:		
Annex to corps standing operating procedure	app. II	215
Battalion group	9, 17, 57	7, 9, 33
Battle group:		
Fire planning	58, 235, 236	34, 172, 173
Observation	64, 65	41, 43
Organization for combat	55, 56, 58	31, 32, 34
Survey	69	45
Tactical missions	58-60	34
Canon-type atomic field	88	62
Chain of command	16	9
Characteristics	6, 7	6
Classification	2-4	3
Commander	15, 16	9
Counterfire information form	189, 202-210	126, 144
Countermortar activities	197-201	138
Echelons directing fires	246	188
Estimates	41-44	25
Fire:		
Plan appendix	230, app. III	168, 248
Planning	233-234	171
Support coordination	219-232	159
Group	10	7
Headquarters location	32	20
Information bulletin	175, app. II	113, 215
Intelligence bulletin	175, app. II	113, 215
Officer	15	9
Periodic intelligence report	175, app. II	113, 215
Preparation, definition	238	176
Prior to attack, actions	100	67
Radar officer	33	21
Reconnaissance	75	49
Requirements, estimate	39	23
Searchlight battery	86	58
Staffs	21	12

	Paragraphs	Page
Artillery—Continued		
Survey-----	67-69	44
With the:		
Army-----	13	8
Corps-----	12	8
Assignment:		
Fire missions-----	231, 247, 170, 189,	
	250	195
Position areas-----	74	49
Tactical missions-----	59, 60	36, 39
Zones of fire-----	40, 61,	23, 40,
	121	83
Assistant:		
Corps artillery officer-----	22	15
Fire support coordinator-----	229	163
Attached artillery-----	9, 54-57,	7, 30,
	78	54
Attachment:		
Armored amphibians-----	83	57
Decentralization of control-----	54, 56	30, 32
Attack of:		
Organized position-----	103	68
Targets-----	168, 175, 108, 113,	
	179-183	117
Augmenting fires-----	56	32
Auxiliary weapons employed as field artillery-----	80-84	56
Available supply rate-----	266	207
Aviation, Army. (<i>See Army aviation.</i>)		
Barrage, definition-----	238	176
Basic load of ammunition-----	265, 267	207, 208
Battalion group. (<i>See Artillery battalion group.</i>)		
Battle position. (<i>See Defensive combat.</i>)		
Battlefield illumination-----	86	58
Biological warfare-----	90	64
Boat assignment tables-----	121	83
Bomb line-----	40	23
Bombing reports. (<i>See Shelling reports.</i>)		
Bulletin:		
Artillery information-----	175, app. II	113, 215
Artillery intelligence-----	175, app. II	113, 215
Burst:		
Height-----	182	122
Pattern-----	215	152
Cannon-type nuclear field artillery-----	88	62
Capabilities, artillery-----	6, app. IV	6, 271
Center. (<i>See Fire direction center and Fire support coordination center.</i>)		
Center of impact-----	182	122
Centralized control-----	54	30
Chart:		
Hostile battery-----	189, 190	126, 128

	Paragraphs	Page
Chart—Continued		
Hostile mortar	189, 190	126, 128
Operations	247	189
Planning	247	189
Visibility	65	31
Chemical warfare	90	64
Clandestine means	193	134
Class V supplies	265, 266	207, 207
Classification of artillery	2-4	3
Coastal frontier defense	164, 165	107
Collection of target information	168, 173, 108, 111, 195, 204	137, 145
Combat:		
In towns	158-160	103
Orders	39, app. II, III	23, 215, 248
Outpost	106	71
Command:		
Liaison	36	22
Post:		
Displacement	75, 76	49, 62
Location	38	23
Relationships	16	9
Report	247	189
Commander:		
Army artillery	19	10
Artillery	16	9
Battalion group	17	9
Group	18	10
Corps artillery	19	10
Division artillery	19	10
Force	19	10
Commander's concept of operation	230	168
Communication	37, 254-264	22, 198
Area systems	257	199
Countermortar activities	199	142
Defensive operation	107	73
Discipline and security	256	198
Facilities for fire support coordination center	228	163
In fire direction center	247	189
Means	255	198
Neutralization of enemy's facilities	242, 243	181, 184
Officer	30	19
Planning	260	200
Principles	259	199
Priority of installation	258	199
Radio	263	201
Requirements in fire planning	236	173
Responsibility	254	198
Wire	262	201
Concentration designation	app. II	215
Contingent zones of fire	121	83

	Paragraphs	Page
Control and coordination.....	7, 35-40	6, 21
Coordinating and limiting measures.....	40	23
Coordination:		
Control and	35-40	21
Fire planning	236	173
Fire support	219-229	159
Coordinator:		
Assistant fire support.....	229	163
Fire support	221, 222, 160, 161, 229	161, 163
Corps:		
Artillery	12	8
Attachments.....	12	8
Commander.....	15, 19	9, 10
Coordination with army artillery.....	236	173
Counterbattery activities and functions.....	193, 194	134, 136
Fire direction center.....	247	189
Fire planning	236	173
Observation functions	63, 65	40, 43
Organization for combat.....	56	32
Position areas	74	49
Radio system	263	201
Survey officer	31	21
Tactical missions	59, 60	36, 39
Wire system	262	201
Fire support coordination center.....	219	159
Survey control	63	45
Counterattack:		
Fires in support.....	243	184
Planning fires to break up enemy.....	238, 242	176, 181
Counterbattery:		
Activities.....	192-196, 247	133, 189
Fires.....	193	134
Functions.....	194	136
Information, agencies contributing.....	195	137
Intelligence.....	192	133
Map.....	189	126
Officer.....	196	137
Organization.....	193	134
Policy.....	193	134
Records.....	189	126
Responsibilities.....	193	134
Counterfire:		
Information form, artillery.....	189, 202-210	126, 144
Squad.....	198	139
Counterintelligence plan	79	55
Countermortar:		
Activities.....	197-201, 247	138, 189
Communication.....	199	142
Intelligence.....	201	143
Map.....	189	126
Officer.....	198	139
Neutralization fires	242	181

	Paragraphs	Page
Countermortar—Continued		
Organization for operations	198, 201	139, 143
Radar	135, 198	95, 139
Records	189	126
Responsibilities	198	139
Counterpreparation	243	184
Covering forces	73	48
Fires in support	243	184
Crater analysis	211-218	151
Appearance of craters	217	155
Artillery shell	211-215	151
Determination of angle of fall	218	156
Determination of direction	215, 218	152, 156
Evaluation	211	151
Inspection of shelled areas	213, 214	151
Mortar shell	216-218	155
Purpose	211	151
Quick fuze	215	152
Survey	214	151
Techniques	218	156
Uses	212	151
Damage reported in shelling reports	206, 207	146, 148
Debarkation and embarkation	121, 123	83, 88
Decentralized control	54, 56	30, 32
Marches	72	47
Offensive action	98	67
Deceptive measures	79, 107	55, 73
Defense:		
Mobile	105	70
Position	105	70
River line	163	106
Towns	160	104
Defensive combat	105	70
Artillery:		
Deceptive measures	79, 107	55, 73
Requirements	42-44	26
Support	243	184
Battle area	107	73
Combat outpost	106	71
Covering forces	106	71
General outpost	106	71
Doctrine	105	70
Fires, categories	243	184
Defensive works, attack	181	120
Delaying action	108, 110	75, 76
Delivery of fire	220, 246	159, 188
Density of fire	182	122
Desert operations	155-157	102
Maintenance requirements	157	103
Observation	156	102
Designation of concentrations	app. II	215
Destruction fires	180	119

	Paragraphs	Page
Diffusion, illumination	86	58
Direct fire:		
In jungle operations	147	99
In towns	159	103
Direct support artillery:		
Coordinating and limiting measures	40	23
Countermortar responsibility	198	139
Fire plan	236	173
Forward observers	64	41
Position areas	74	49
Tactical mission	59	36
Displacement	76, 106, 107	52, 71, 73
Dissemination of information and intelligence	170, 175	109, 113
Division artillery:		
Commander	19, 198, 246	10, 139, 188
Countermortar functions	198	139
Fire:		
Direction center	247	189
Direction relationship with corps artillery	246	188
Planning	236	173
Observation functions	65	43
Operation order	app. II, III	215, 248
Organization for combat	55	31
Position areas	74	49
Reconnaissance	75	49
Reserve division	62	40
Wire communication system	262	201
Division fire support coordination center	223-229	161
Duties:		
Adjutant (S1)	25	16
Army aviation officer	32	20
Army, corps, division, and task force artillery commanders.	19	10
Assistant corps artillery officer	22	15
Assistant division artillery executive officer	23	15
Battalion group commander	17	9
Communication officer	30	19
Counterbattery intelligence officer	195, 196, 247	137, 189
Countermortar intelligence officer	198, 247	139, 189
Deputy army artillery commander	22	15
Executive officer	24	16
Fire direction center personnel	247	29
Fire support coordination center personnel	229	163
Group commander	18	10
Liaison officer	29	19
Photograph interpreter	173, 247	111, 189
Radar officer	33	21
Reconnaissance and survey officer	31	20
S1	25	16
S2	26	16

	Paragraphs	Page
Duties—Continued		
S3	27	17
S4	28	18
Theater army and army group artillery officers	20	11
Economy of force	49	29
Embarkation and debarkation	121, 123	83, 88
Embarkation, artillery organization for	121	83
Encircling force	102	68
Enemy:		
Attack, fires during	238	176
Countermeasures, analysis	179	117
Reinforcement, planning fires to prevent	243	184
Troops, morale	182	122
Weapons:		
Location by radar	63-64	40
Neutralization fires against	180, 234, 119, 172, 238, 242	176, 181
Estimate:		
Artillery requirements	41-44	25
The situation	39	23
Evaluation of information	174	112
Examples:		
Artillery annex to corps standing operating procedure.	app. II	215
Corps fire support plan annex	app. III	248
Corps operation order	app. III	248
Corps or division artillery intelligence bulletin	app. II	215
Division air fire plan	app. III	248
Division artillery fire plan	app. III	248
Division artillery operations chart	app. III	248
Division fire support plan annex	app. III	248
Division operation order (overlay type)	app. III	248
Fire capabilities checklist (procedure for preparing schedules of corps artillery fires).	app. IV	271
Fire support plan annex to force operation order	app. II	215
Naval gunfire plan	app. III	248
Nuclear fire plan	app. III	248
Periodic intelligence report	app. II	215
Planning artillery operations and fire support	app. III	248
Position areas and zones of fire	app. III	248
Target summary	app. II	215
Executive officer, duties	24	16
Exploitation	104	69
Field artillery:		
Assignment of tactical missions to	59, 60	36, 39
Battalions:		
Army, light	56	32
Fire planning	236	173
Cannon-type nuclear	88	62
Countermortar activities	197-201	138
Group	10, 57	7, 33
Commander	18	10

	Paragraphs	Page
Field Artillery—Continued		
Group—Continued		
Fire direction center	247	189
Fire planning	236	173
Observation	65	43
Radio system	263	201
Reconnaissance	75	49
Tactical missions	60	39
Wire system	262	201
Guided missiles. (<i>See</i> Missiles.)		
Heavy	3, 56,	3, 22,
	147	99
Liaison officer, countermortar functions	198, 201	139, 143
Light	3, 56,	3, 22,
	139, 147	96, 99
Maneuver of units	70-73, 76,	46, 52,
	77	53
Medium	3, 56	3, 32
Missiles	2, 4,	3, 4,
	89	63
Missions	5, 59	5, 36
Observation battalion	56, 87	32, 60
Flash ranging	64	41
Missions	87	60
Meteorological functions	87	60
Radar ranging	64, 200	41, 142
Sound ranging	64, 200	41, 142
Position areas	74, 107,	49, 73,
	121	83
Radar	198	139
Role for auxiliary weapons	80	56
Searchlight battery	86	58
Survey functions	67-69, 87	44, 60
Very heavy	3, 56	3, 32
File:		
General target	189	126
Hostile battery	189, 190	126, 128
Hostile mortar	189, 190	126, 128
Fire(s):		
Capabilities overlay	247	189
Concentration	238	176
Coordination	219-233	159, 172
Counterbattery	171, 192	110, 133
Countermortar	171, 198	110, 139
Counterpreparation	238, 243	176, 184
Defensive, categories	243	184
Density	182	122
Destruction	180	119
Distribution	220, 238, 159, 176,	
	251	196
During:		
Attack of an organized position	103	68

	Paragraphs	Page
Fire(s)—Continued		
During—Continued		
Enemy attack	243	184
Meeting engagement	101	68
Group	238	176
Harassing	180, 243	119, 184
In support:		
Attack	242	181
Counterattack	243	184
Covering forces and outposts	243	184
Defensive operations	243	184
Exploitation	104	69
Interdiction	180, 243	119, 184
Long-range	107	73
Massing	248-253	195
Neutralization	180	120
Nuclear	244	186
Planned	238	176
Prearranged	101, 103, 238	68, 176
Preparation	103, 238, 242	68, 176, 181
Program	238	176
Requests	234	172
Scheduled	238	176
Superiority	242	181
Types	180, 238	119, 176
Zones	40	23
Fire direction	245-247	188
Center	247	189
Relationship of artillery echelons	247	189
Responsibilities	246	188
Fire missions:		
Assignment	231, 247, 170, 250	189, 195
Record	247	189
Fire plan(s)	238	176
Air	229, 230, 163, 168, app. II, III	215, 248
Artillery	230, 236-238, 168, 173, app. II, III	215, 248
Direct support	236	173
Naval gunfire	230, app. II, 168, 215, III	248
Nuclear	230, 244, 168, 186, app. II, III	215, 248
Preparation	238, 244	176, 186
Fire planning	233-244	172
Army artillery	236	173
Battalion	236	173
Battle group artillery	236	173
Corps artillery	236, app. IV	173, 271

	Paragraphs	Page
Fire planning—Continued		
Division artillery	236	173
Factors	234, 235	172
Group artillery	236	173
Process	236	173
Responsibilities	236, 237	173, 175
Terms, definitions	238	176
Fire support:		
Channels for request	232	171
During displacement	76	52
Functions	224	161
Means	181	120
Coordination	230	168
Selection	181, 231	120, 170
Nuclear	244, app. II	186, 215
Plan annex	229, 230, 163, 168,	
.....	237	175
Example	app. III	248
Form	app. II	215
Planning	39, 230	23, 168
Fire support coordination center	219–222, 232	159, 171
Principles	220	159
Procedures	220	159
Relationships	222	161
Personnel responsible	221	160
Use of nuclear firepower	229, 232	163, 171
Fire support coordination center	219, 223–229	159, 161
Army	219	159
Communications	228	163
Composition	227	162
Establishment	225	162
Functions	224	161
Location	226	162
Personnel	227, 229	162, 163
Records	229	163
Fire support coordinator	220–222	159
Functions	224	164
Responsibilities	221, 229	160
Flak suppression	172, 241	111, 181
Flank guard	73	48
Flares, aircraft	66	44
Flash bases	64	41
Flash-bang report	191, 206	132, 146
Flash ranging	64	41
Force:		
Commander	19, 220,	10, 159,
.....	221	160
Economy	49	29
Encircling	102	68
G3 (S3)	27, 221	17, 160
Forms (See also Examples.):		
Artillery:		
Counterfire information (figs. 13 and 14)	189, 202–210	126, 144

	Paragraphs	Page
Forms—Continued		
Artillery—Continued		
Fire support plan annex.....	app. II, III	215, 248
Information bulletin, army or theater army.....	app. II	215
Intelligence bulletin, corps or division.....	app. II	215
Periodic intelligence report.....	app. II	215
Operation order.....	app. II, III	215, 248
Operation plan.....	app. II, III	215, 248
Standing operating procedure, corps.....	app. II	215
Target:		
Analysis.....	app. II	215
Analysis, nuclear weapons.....	app. II	215
Summary.....	app. II	215
Formation of tactical groupings.....	57	33
Forward observation.....	66	41
Fragment analysis.....	203, 206	145, 146
G2 representative in FSCC.....	229	163
G3 air in FSCC.....	229	163
G3 fire support coordination functions.....	221, 222	160, 161
General:		
Outpost.....	106	71
Support artillery.....	56, 58, 59, 236	32, 34, 36, 173
General target:		
File.....	189	126
Information records.....	189	126
Overlay.....	189, 190	126, 190
Group:		
Artillery.....	10	7
Commander.....	18	10
Field artillery. (<i>See</i> Field artillery group.)		
Group of fires.....	238	176
Ground reconnaissance.....	75	49
Guided missiles. (<i>See</i> Missiles.)		
Harassing fire.....	180, 182, 119, 122, 243	184
Headquarters battery, location.....	38	23
Heavy field artillery.....	3, 147	3, 99
Height of burst.....	182	122
Hostile battery:		
Chart.....	189	126
Criteria for confirming.....	188	125
File.....	189	126
List.....	175	113
Hostile mortar:		
Chart.....	189	126
File.....	189	126
List.....	175	113
Howitzer companies.....	84	57
Hydrographic effects in amphibious operations.....	120	81

	Paragraphs	Page
Illumination:		
Battlefield	66, 86	44, 58
Plan	86	58
Searchlight	86	58
Illuminating shells	66	44
Infantry:		
Counterfire squad	198	139
Countermortar activities	201	143
Information:		
Accuracy	174, 205	112, 145
Bulletin, artillery	175, app. II	113, 215
Collection agencies	173	111
Evaluation	174	112
Interchange	168	108
Interpretation	174	112
Obtained from shelling reports	191, 202, 204-206	132, 144, 145
Pertinence	174	172
Integration:		
Artillery fires and plan of operations	246	188
Command installations	226	162
Fire plans	236	173
Fire support	219, 230	159, 168
Nuclear firepower and plan of maneuver	178, 244	117, 186
Intelligence	166-168, 175	108, 113
Bulletin, artillery	175, app. II	113, 215
Communication	199, 254	142, 198
Counterbattery	192	133
Derived from shelling reports	191	132
Dissemination	175	113
Map:		
Counterbattery	189	126
Countermortar	189	126
Officer duties	26	16
Counterbattery	194, 196, 136, 137, 247	137, 189
Countermortar	198, 247	139, 189
Report, artillery periodic	175, app. II	113, 215
Target	166-169	108
Interdiction fire	180, 182, 243	119, 122, 184
Interpretation:		
Aerial photographs	170, 173	109, 111
Information	174	112
Interpreter, photograph	247	189
Journal:		
S2	189	126
S3	247	189
Jungle operations	145-154	99
Ammunition supply and storage	153	101
Army aircraft	146, 148, 154	99, 100, 102

	Paragraphs	Page
Jungle Operations—Continued		
Artillery fires	147, 153	99, 101
Communication	154	102
Direct fire	147	99
Fuze action	153	101
High-angle fire	147, 148	99, 100
Mobility	146	97
Observation	148	100
Positions	151	101
Security	151, 152	101
Sound sensings	147	99
Special equipment	146	99
Survey	149	100
Target locating means	150	101
Training	145	99
Landing force	119, 120	80, 81
Liaison	36, 46	22, 28
Officer	29	19
Special operations	113, 115	78, 79
Light artillery	3, 139,	3, 96,
	147	99
Limitations:		
Artillery	7	6
Flash ranging	64	41
Observation	64, 135,	41, 95,
	142, 148	98, 100
Radar ranging	64, 145	41, 95
Radio communication	137, 144,	96, 98,
	154, 263	102, 201
Sound ranging	64, 135	41, 95
Wire communication	137, 144,	96, 98,
	154, 262	102, 201
Limiting and coordinating measures	40	23
Line(s) :		
Bomb	40	23
No-fire	40	23
Nuclear safety	40	23
0-0	40	23
List:		
Hostile battery	175, app. II	113, 215
Hostile mortar	175, app. II	113, 215
Location:		
Artillery headquarters	38	23
Bomblines	40	23
Center of impact	182	122
Command post	38	23
Concentrations	238, 250	176, 195
Enemy weapons:		
Crater analysis	211-218	151
Flash, radar, and sound ranging	64, 200	41, 142
Target prediction	200	142
Fire direction center	247	189

	Paragraphs	Page
Location—Continued		
Fire support coordination center	226	162
No-fire line	40	23
Nuclear safety line	40	23
0-0 line	40	23
Position areas	74, 97, 121	49, 66, 83
LST's, beaching	121, 123	83, 88
LVT (A)'s used as field artillery	83	57
Maneuver	48, 70-73	28, 46
Plan:		
Integration with nuclear firepower	240	179
Landing	119, 120	80, 81
Portion of concept of operations	230, app. II, III	168, 215, 248
Map:		
Counterbattery intelligence	189	126
Countermortar intelligence	189	126
Reconnaissance	75	49
S2 situation	189	126
Marches, tactical	72	47
Mass, principle	47	28
Massed fires during preparation	103, 242	68, 181
Massing fires	47, 248-253	28, 195
Materiel targets	181	120
Medium artillery	3, 107	3, 73
Meeting engagements	98, 101	67, 68
Meteorological conditions	117, 140, 147	80, 97, 99
Missiles	2, 4, 55, 56, 89, 245, 247	3, 4, 31, 32, 63, 188, 189
Missions	5, 59	5, 36
Mobile defense	105	70
Mobility	71, 133, 139, 146	47, 94, 96, 99
Modification of tactical missions	59	36
Morale of enemy troops	180, 182	119, 122
Mortar:		
Crater analysis	216-218	155
Location methods	200	142
Reports. (See Shelling reports.)		
Motor:		
Movements	72, 133	47, 94
Officer	71	47
Mountain operations	138-144	96
Aeropack artillery	139	96
Altitude effects	138	96
Ammunition	141	97
Artillery fires	140	97
Artillery targets	142	98

	Paragraphs	Page
Mountain Operations—Continued		
Communication	144	98
Control of artillery	143	98
Employment of guns	140	97
Employment of howitzers	140	97
Fuzes	141	97
High-angle fire	140	97
Locating hostile weapons	142	98
Massed artillery fire	142	98
Mobility	139	96
Observation	140, 142	97, 98
Photograph interpretation	142	98
Self-propelled artillery	139	97
Targets and target locations	142	98
Time factor	138	96
Towed weapons	139	97
Movement	72, 77	47, 53
Moving target detection	64	41
Naval gunfire:		
Employment	113, 120, 181, 229, 232	78, 81, 163, 171
General	219, 230	159
Officer	229	163
Plan appendix	230, app. III	168, 248
Support channels	232, 247	171, 189
Neutralization fire	180	119
Night surveillance by Army aviation	93	65
No-fire lines	40	23
Nuclear:		
Ammunition supply procedures	268	209
Effect of capability on target intelligence	169	109
Effect of firepower	178	117
Effect on target area	181, app. II	120, 215
Employment against personnel	181, app. II	120, 215
Enemy employment:		
In airborne operations	126	92
In snow and cold	130	93
In river crossings	162	104
Fire plan	230, 244, app. III	168, 186, 248
Appendix	app. III	248
Preparation	244, 247	186, 189
Processing of requests	232	171
Responsibility	19, 229	10, 164
Firepower	181, 244	120, 186
Decision to employ	181, 232	120, 171
In offense	95	66
In defense	107	73
In airborne operations	124	90
In a river crossing	162	104

	Paragraphs	Page
Nuclear—Continued		
Firepower—Continued		
In a defense of a river line.....	163	106
With missiles	89	63
Method of attack.....	182, app. II	122, 215
Safety measures	40, 229, 23,	163,
	247	189
Security measures	244	186
Target analysis	177, 229, 116,	163,
	app. II	215
Targets of opportunity.....	240	179
Observation.....	63-66	40
Aerial.....	64	41
Coordination.....	26, 63,	16, 40,
	65	43
Forward.....	64, 107	41, 73
Functions.....	65	43
Hostile, planning fires to neutralize.....	234	172
Means.....	64	41
Posts.....	64	41
Responsibilities.....	65	43
Observation battalion, field artillery.		
(See Field artillery observation battalion.)		
Observers:		
Aerial.....	64, 75,	41, 49,
	121, 135,	83, 95,
	140, 142,	97, 98,
	148	100
Forward.....	64, 107,	41, 73,
	135, 148,	95, 100,
	159	103
Offensive combat	95-104	66
Artillery support	96, 97	66
Attack of organized position.....	103	68
On-call fires	238	176
0-0 line	40	23
Operation(s):		
Airborne. (See Airborne operations.)		
Amphibious. (See Amphibious operations.)		
Arctic. (See Arctic operations.)		
Chart.....	247	189
Defensive. (See Defensive combat.)		
Desert. (See Desert operations.)		
Jungle. (See Jungle operations.)		
Mountain. (See Mountain operations.)		
Order.....	230, app. II, 168,	215,
	III	248
Plan.....	39, app. II, 23,	215,
	III	248
Report, periodic	247	189
Special. (See Special operations.)		
Tentative plan.....	230	168

	Paragraphs	Page
Opportunity, targets	239, 240	179, 179
Organization for combat	51-62, app. III	30, 248
Outpost:		
Combat	106	71
Fires in support	106	71
General	106	71
Overlay:		
Fire capabilities	247	189
General target	189	126
Roving gun location	189	126
Shelling report	189	126
Suspect location	189	126
Type operation order	app. III	248
Passage of lines	77	53
Patrols	150, 173	101, 111
Periodic:		
Intelligence report form	175, app. II	113, 215
Operations report	247	189
Pertinence of information	174	112
Photograph:		
Interpretation	170, 173	109, 111
Interpreter duties	247	189
Plan:		
Air fire	229, 230, 163, 168, app. II, III	215, 248
Artillery fire	230, 236-238, 168, 173, app. II, III	215, 248
Collection	173	111
Counterintelligence	79	55
Direct support fire	236	173
Fire support	229, 230, 163, 168, app. II, III	215, 248
Nuclear fire	230, 244, 168, 186, app. II, III	215, 248
Of illumination	86	58
Observation	65, 173	43, 111
Planned fires	238	176
Planning:		
Chart	247	189
Fire support	237	175
Fires	233-244	172
Procedure	237	175
Platoon searchlight	86	58
Plotting:		
Targets	190	128
Shelling reports	191	132
Policy, counterbattery	193	134
Position:		
Alternate and supplementary	107	73
Area reconnaissance	70, 75	46, 49
Areas	74, 107, 121, 134	49, 73, 83, 94

	Paragraphs	Page
Position—Continued		
Coordination of field artillery missiles.....	75, 88,	49, 62,
	89	63
Defense.....	105	70
Dummy.....	79	55
Temporary.....	79	55
Post strike analysis.....	170	109
Prearranged fire.....	101, 103,	68, 176
	238	
Prediction, target.....	200	142
Preparation fires.....	103, 238,	68, 176,
	242	181
Preplanned air support requests.....	229	163
Primary means selected for attack of target.....	180, 181	119, 120
Principles of fire support coordination.....	220	159
Priority:		
Attack of targets.....	179	117
For assignment of prearranged missions.....	181	120
For position areas.....	74	49
Of fires.....	59	36
Of targets.....	179	117
Road.....	101, 108	68, 75
Procedure for:		
Artillery fire planning.....	237	175
Assignment of fire missions.....	231, 247	170, 189
Fire support coordination.....	230-232	168
Processing information.....	187-191	125
Processing target information.....	174, 187-191	112, 125
Program of fires.....	238	176
Projectiles, nuclear.....	88, 268	62, 209
Pursuit action.....	102	68
Radar:		
Countermortar operations.....	64, 198	41, 128
Duties of countermortar intelligence officer.....	198, 247	139, 189
Field artillery.....	64, 87	41, 60
Officer.....	33	21
Ranging.....	64, 173,	41, 111,
	200	142
Radio communication.....	263	201
Rear:		
Defensive position.....	107	73
Guard.....	73	48
Reconnaissance:		
Coordination.....	75	49
Means.....	75	49
Responsibilities.....	75	49
Survey officer, and.....	31	20
Recording target information.....	189	126
Records:		
Counterbattery.....	189	126
Countermortar.....	189	126
Fire support coordination center.....	229	163
General target information.....	189	126

	Paragraphs	Page
Recuperability, target	183	123
References	app. I	211
Reflection, illumination	86	58
Registration	99	66
Coordination	99	67
Precautions	252	196
Positions	79, 99	55, 67
Rehearsals:		
Airborne operations	126	92
Amphibious operations	122	88
Reinforcing mission	59, 60	36, 39
Reliability of target information	174	112
Relief in combat	77	53
Reorganization, planning fires to protect	242	181
Requests:		
Air support	229, 232	163, 171
Artillery fire support	220, 232, 159, 171, 249, 253	195, 196
Naval gunfire support	232	171
Required supply rate	266	207
Reserve units, artillery	56, 62, 88	32, 40, 62
Retirement	108, 111	75, 77
Retrograde movements	108-111	75
River crossings	161, 162	104
River line, defense	163	106
Road priority	101, 108	68, 75
Rockets. (See Missiles.)		
Route reconnaissance	75, 76	49, 52
Roving gun location overlay	189	126
S1	25	16
S2	26, 194, 198	16, 136, 139
Coordination of observation	26	16
Journal	189	126
Situation map	26, 189	16, 126
S3	27, 194, 198, 247	17, 136, 139, 189
Journal	247	189
S4	28	18
Safety measures	40, 224, 244	23, 161, 186
Schedules of fires	238	176
Scheduled fires	238	176
Seacoast defense	164, 165	107
Searchlight battery, field artillery	86	58
Searchlight illumination	86	58
Sector of search overlays	65	43
Security:		
Forces	73, 106	48, 71
Measures	73, 79, 129, 152	48, 55, 93, 101

	Paragraphs	Page
Security—Continued		
Of nuclear fires.....	244	186
Selection:		
Fire support means.....	219, 231	159, 170
Position areas	70, 73, 74	46, 48, 49
Targets for nuclear attack.....	240, 244	179, 186
Self-propelled artillery	3, 84	3, 57
In a delaying action.....	110	76
In exploitation	104	69
In mountain operations.....	139	96
In support of encircling force.....	102	68
In support of pursuit forces.....	102	68
With security forces.....	73	48
Series of fires.....	238	176
Shelling reports	202-210	144
Accuracy	205	145
Content	206	146
Craters. (<i>See</i> Crater analysis.)		
Damage.....	206	146
Direction.....	206	146
Evaluation.....	191	132
Information derived	202, 204	144, 145
Instructions.....	207	148
Overlay	189	126
Plotting.....	190, 191	128, 132
Position of observer.....	206	146
Purpose.....	191	132
Source identification	206	146
Specialists	205	145
Transmission.....	207, 210	148, 150
Ship-to-shore movement	121-123	83
Signal operation instructions	260, 261	200
Situation:		
Estimate.....	39	23
Map, S2	26, 189	16, 126
Snow, operations	130-137	93
Sound ranging	64, 135, 173, 200	41, 95, 111, 142
Sources of target information.....	173	111
Special operations	112-117	78
Considerations affecting artillery.....	113, 117	78, 80
Control.....	116	80
Coordination.....	113	78
Definition.....	112	78
Liaison.....	115	79
Planning.....	113	78
Training.....	114	79
Standing operating procedure.....	39, 178, app. II	23, 117, 215
Standing signal instructions.....	260, 261	200
Supplementary positions	107	73
Support, mission type order.....	58, app. III	34, 248

	Paragraphs	Page
Supported unit:		
Commander.....	16, 221	9, 160
Plans.....	36, 39	22, 23
Surprise.....	50	29
Survey.....	67-69	44
Control.....	68	45
Echelons.....	69	45
Factors affecting.....	67, 132, 149	44, 94, 100
For crater location.....	214	151
Information center.....	69	45
Information, exchange.....	31	20
Officer, corps artillery.....	69	45
Officer's duties.....	31	20
Plan.....	67	44
Responsibility.....	67, 69	44, 45
Time required.....	67	44
Suspect location overlay.....	189	126
Tactical:		
Groupings, formation.....	57	33
Marches.....	72	47
Missions.....	59-60	36
Nuclear field artillery.....	88	62
Commanders authorized to assign.....	54-56, 60	30, 39
Field artillery.....	59	36
Observation battalion, field artillery.....	87	60
Tactical air:		
Alert aircraft.....	229	163
Alert information.....	264	202
Fire plan.....	229, 230, 163, 168, app. III	248
Liaison officer's duties.....	229	163
Photographs. (See Aerial photographs.)		
Reconnaissance.....	173, 195, 111, 137, 229	163
Support:		
Adviser.....	229	163
Channels.....	232	171
Estimates.....	113, 120, 181	78, 81, 120
General.....	219	159
Missions.....	181	120
Priority of assignment.....	181	120
Requests.....	229, 232, 163, 171, 247	171, 189
Tanks used as field artillery.....	81	57
Target analysis.....	176-184	115
Decision.....	184	124
Definition.....	176	115
Determination of suitable weapons.....	181	120
Method of attack.....	182	122
Mission of the supported force.....	178	117

	Paragraphs	Page
Target Analysis—Continued		
Process.....	177	116
Selection of type of fire.....	180	119
Target characteristics.....	179	117
Time of attack.....	183	123
Target(s) :		
Attack.....	179-184	117
Characteristics.....	179, 240	117, 179
Confirmed.....	188	125
Description.....	190	128
Designation.....	190, app. II	128, 215
File, general.....	189	126
Information:		
Collection.....	173	111
Dissemination.....	175	113
Processing.....	174, 187-191	112, 125
Records, general.....	189	126
Sources and agencies.....	173	111
Terms and definitions.....	188	125
Intelligence.....	168-75	108
Materiel.....	181	120
Nuclear.....	240, 244	179, 186
Of opportunity.....	239, 240	179
Overlay, general.....	189	126
Personnel.....	181	120
Plotting.....	190	128
Prediction.....	200	142
Priority.....	179	117
Reconnaissance.....	75	49
Responsibility for attack.....	221	160
Status, change.....	190	128
Summary.....	175, app. II	113, 215
Waterborne.....	165	107
Task force artillery commander.....	19	10
Temporary positions.....	79	55
Theater army artillery.....	14	8
Officer.....	20	11
Staff.....	21	12
Time:		
Of attack.....	183	123
Of flash to bang.....	206	146
Of opening fire.....	243	184
On target.....	182, app. II	122, 215
Towed artillery weapons.....	3, 139	3, 96
Towns, combat.....	158-160	103
Transport, organic.....	3	3
Unit:		
Airfields.....	94	65
Aviation officer.....	32	20
Very heavy field artillery.....	3	3
Visibility charts.....	65	43
Vulnerability.....	181	120

	Paragraphs	Page
Warheads.....	89	63
Warning, air.....	264	202
Warning orders.....	77	53
Waterborne targets.....	165	107
Weapons:		
Accuracy.....	181	120
Artillery, classification.....	2-4	3
Auxiliary.....	80-84	56
Effects.....	180, 181	119, 120
For offensive operations.....	242	181
Nuclear.....	88	62
Weather:		
Cold, effects.....	130-137	93
Effects on firing data.....	117	80
Weight classification of artillery.....	3	3
Winterization of equipment.....	131	93
Wire:		
Communication systems.....	262	201
Laying by aircraft.....	92, 137	64, 96
Withdrawal from action.....	108, 109	75, 76
Zone of fire.....	40, 61,	23, 40,
	121	83

By Order of *Wilber M. Brucker*, Secretary of the Army:

MAXWELL D. TAYLOR,
General, United States Army,
Chief of Staff.

Official:

R. V. LEE,
Major General, United States Army,
The Adjutant General.

Distribution:

Active Army:

CNGB (2)
DCSPER (2)
ACSI (2)
DCSOPS (2)
DCSLOG (2)
Technical Stf, DA (1)
Technical Stf Bd (1)
USCONARC (15)
US ARADCOM (2)
US ARADCOM, Rgn (2)
OS Maj Comd (5)
Log Comd (2)
MDW (1)
Armies (5)
Corps (5)
Div (3)
Brig (1)
Regt/Gp/Bg (1) except
FA Gp (2)
Bn (1) except FA Bn (5)
Co/Btry (1) except
FA Btry (5)
USATC (Armor) (5)
USATC (FA) (5)
USMA (50)

USACGSC (2500)
USAWC (5)
Br Svc Sch (5) except
USACMLCSCH (10)
USAIS (960)
USARADSCH (20)
USAARMS (1850)
USAAMS (3200)
USAAVNS (500)
USAINTC (17)
PMST Sr Div Units (3)
PMST Jr Div Units (3)
RMST Mil Sch Div Units
(3)
Mn Dist (1)
USA Corps (Res) (1)
Sector Comd, USA Corps
(Res) (1)
MAAG (2)
Mil Mis (1)
Units org under fol TOE:
6-100 (10)
6-200 (10)
6-300 (10)

NG: State AG (3); units—same as Active Army except allowance is one copy to each unit.

USAR: Same as Active Army except allowance is one copy to each unit.
For explanation of abbreviations used, see AR 320-50.